

IN THE SENATE OF THE UNITED STATES.

JUNE 11, 1888.—Ordered to be printed and recommitted to the Committee on Finance.

Mr. MORRILL, from the Committee on Finance, presented a letter from the Secretary of the Treasury, addressed to him as chairman of said committee, transmitting a report of the Chief of the Bureau of Engraving and Printing relative to the printing of Government securities.

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, D. C., June 5, 1888.

SIR: Referring to your letter of April 9, 1888, inclosing Senate bill 1472 relative to the printing of Government securities, etc., I have the honor to transmit herewith a report on the subject from the Chief of the Bureau of Engraving and Printing, dated May 9, 1888.

Very respectfully,

C. S. FAIRCHILD,
Secretary.

Hon. JUSTIN S. MORRILL,
Chairman Committee on Finance, U. S. Senate.

TREASURY DEPARTMENT,
Bureau of Engraving and Printing, May 9, 1888.

SIR: I have the honor to acknowledge the receipt, by reference from the Department, with instructions to report thereon, of a communication, dated April 9, 1888, from the Hon. Justin S. Morrill, chairman of the Committee on Finance of the United States Senate, transmitting a copy of Senate bill No. 1472, which provides that all Government securities shall be printed on hand-roller presses, and that the chief and assistant chief of this Bureau shall be practical engravers or plate printers, and asking the views of the Department as to the propriety and necessity of the proposed legislation, together with such facts as it may have bearing thereon.

The letter and bill are herewith returned with the following report:

The presentation of this measure is doubtless due to the recent introduction into this Bureau of additional steam-power plate-printing presses, and its purpose is to prevent the further use of those presses, or of any other than hand-roller presses, in the printing of the public securities.

There are in use in this Bureau for this purpose four general classes of presses: (1) ordinary surface-printing or typographic presses; (2) a steam-power plate-printing press of the Homer Lee pattern; (3) steam-power plate-printing presses of the Milligan pattern; and (4) ordinary hand-roller presses.

SURFACE-PRINTING PRESSES.

The surface-printing presses are used to print the tints on certain varieties of internal-revenue stamps and on many kinds of drafts, checks, and warrants, the green charter-numbers on national-bank notes of the series of 1882, and the seals on all national-bank notes. Similar presses are used in the office of the Treasurer of the United States to print the seals on United States notes and silver certificates. The tints and seals are printed from steel dies by the ordinary surface process, the effect being produced by the raised lines of the die instead of by the depressed lines of the plate as in plate-printing. The printing done by this process does not equal plate-printing in fineness and delicacy, but it is believed to answer its purpose sufficiently well so far as the seals and tints are concerned. The chief purpose of the elaborate printing upon the public securities is to prevent counterfeiting, and there is nothing to show that the use of the surface-printing process in printing seals and tints has facilitated the counterfeiting of the securities upon which it has been used. The printing of seals and tints by the present method in this Bureau and in the Treasurer's Office requires the services of 6 pressmen, 11 feeders, and 2 counters; the annual cost is about \$25,500. To print them by hand by the plate-printing process would require the services of 90 plate-printers, 90 printers' assistants, and 15 other operatives, and the annual cost would be \$248,700, an increase over the present cost of \$222,200.

The ornamental charter-numbers in green ink on the backs of the national-bank notes of the series of 1882, printed by this process, are, in my opinion, of a quality unfit to be used on the public securities. The backs of the national-bank notes of the series of 1875 are printed in two colors, and consist of a green border of lathe-work and ornamental work, embracing denominational counters and the legend, and of an engraving of some appropriate subject from American history beautifully engraved and printed in black. The two colors afford a pleasing contrast, while the two printings and the quality of the work furnish excellent protection against counterfeiting. In the backs of the series of 1882 the old borders have been retained, but the beautiful black vignettes have been dropped, and the space formerly occupied by them has been filled in with geometric lathe work of a cheap and open design. These backs are printed in brown ink, and over the lathe work covering the center of the plate the charter-number of the bank is printed in green ink from brass dies on an ordinary power-press. The combination of the two printings is ugly in the extreme. It does not furnish the best security against counterfeiting, and it is greatly inferior to the backs of the series of 1875, which it replaced. It would, in my opinion, be wise policy to restore the two plate-printings of the old design. In a letter addressed by me to the Comptroller of the Currency January 11, 1888 (Appendix K), I earnestly urged this change. To carry this suggestion into effect would require the services of 7 plate-printers, 7 printers' assistants, and 2 other operatives, and would involve an additional cost of \$12,000 per annum.

The inferiority of surface or relief printing to plate-printing is due to the fact that when the impression is made by raised lines the lines must have an appreciable thickness, while in printing by the plate process, where the dampened paper is forced into the incised lines of the plate, the lines may be of extreme thinness and yet print clearly. In relief-printing the line is only a colored surface of paper, while in plate-printing it is a cast from the depressed lines of the plate.

THE HOMER LEE PRESS.

Next in the scale of excellence is printing by presses which perform automatically, without the aid of a plate-printer, all of the operations of plate-printing, including the inking-in, the wiping, and the polishing of the plate, and the taking of the impression. The Homer Lee press in operation in the Bureau is of this class. This press has been used exclusively of late in printing the green internal-revenue stamps for tobacco of the denominations of 2 and 8 ounces. While the impressions produced by this press have not the fullness and richness of color of the best hand-work, they are perfectly clear and sharp. In security against counterfeiting, which is the ultimate test of their excellence, they are fully equal to hand-work. It is not at all material that the printing should conform to the arbitrary standard of hand-printing, so long as the essential element of security is not sacrificed.

This press was highly commended in a report made April 30, 1883, by a committee appointed by the Secretary of the Treasury (Appendix F). The Secretary, on May 24, 1884, by an indorsement on this report, directed the chief of this Bureau "to acquire the Lee press now in the Bureau, as well as three presses of the cylindrical pattern recommended by the committee, other presses to be acquired as the needs of the department shall dictate," but, for some unknown reason, the owner of the press failed to submit terms for the sale of any of his presses to the Government, and repeated attempts since made to renew negotiations with that object have failed. The press now in the Bureau is the property of Mr. Homer Lee, and a royalty is paid to him of \$1 for each 1,000 perfect impressions printed on it. To replace this press with hand presses would require 5 additional plate printers and 5 printer's assistants, and would increase the annual expense of the Bureau \$5,124.

In the spring of 1885, the four years' contract then running being about to expire, a question arose in the Post-Office Department as to the process to be adopted for printing the postage-stamps for the next four years. The Postmaster-General, after a personal inspection of the Lee press in operation in this Bureau, decided to have the stamps printed by the "all steam" process, *i. e.*, by a press which, like the Lee press, performs automatically all of the operations of plate-printing. By direction of the Secretary of the Treasury, this Bureau submitted proposals for the work, but being unable to obtain additional presses of this kind, it was unsuccessful in the competition. The award was made to a private company, which prints the stamps on an automatic press of its own devising not open to public use. I am informed that the printing of the stamps is entirely satisfactory to the Post-Office Department. Certainly the appearance of the stamps themselves shows no impairment of the quality of printing. The bill under consideration requires the postage-stamps to be printed on hand-roller presses. On the basis of the bids of 1885 this would involve an additional annual cost of \$22,784.73, chargeable to the postal revenues, out of which the expenses of printing the stamps is paid. The postal notes are printed by the same company, and, it is understood, by the same process, under a contract made 1887.

THE MILLIGAN PRESSES.

Approaching most closely to hand printing is the printing done by the Milligan press. It is the recent introduction into this Bureau of additional presses of this pattern that has led to the presentation of the bill under consideration.

One or more of these presses have been in operation in this Bureau, during the last ten years, and numerous reports concerning the press have been made to Congress or the Department, all of which pronounce in favor of its economy and efficiency for the lower grades of work, such as internal-revenue stamps and the backs of notes. The first of these reports was made to the Secretary of the Treasury June 9, 1877, by a committee of which Mr. George W. Casilear, then superintendent of the engraving division of this Bureau, was chairman, and Mr. Ward Morgan, then and now superintendent of printing, a member (Appendix A). The press reported upon was the original press of this construction then in experimental operation. They reported that "there are certain classes of work which might be satisfactorily printed upon the press with more economy and more rapidity than by hand press." In consequence of this report the press was introduced into the Bureau.

February 26, 1879, a committee, of which Hon. Hiram P. Bell, M. C. a member of the Committee on Banking and Currency, was chairman, made an elaborate report to the Secretary on this and another steam-press (Appendix B). They reported that, "in our judgment, several classes of printing might be done on that (the Milligan) press in a satisfactory manner and with considerable saving to the Government." They further reported that "it might be to the advantage of the Government to procure a limited number of presses to be used in printing such securities as, hereinbefore indicated, might be executed thereon," and that "the question of economy is settled beyond dispute, by the statistics furnished by the chief of the Bureau, in favor of the steam-presses." The committee, in its report, divided the various classes of securities produced by the Bureau into three grades, and placed the backs of notes in the third or lowest grade. In pursuance of the recommendation made in this report, five additional Milligan presses were built and set in operation in the Bureau.

May 8, 1882, Mr. O. H. Irish, the Chief of the Bureau, made a report to the Secretary of the Treasury concerning steam presses (Appendix C), in which he said :

The work executed upon these (the Milligan) presses is that recognized in the business as of second quality, mainly composed of lettering, lathe, and scroll work, such as backs of notes, certificates, and such stamps as the 2, 4, and 8-ounce tobacco stamps. The excellence of the impressions of this class of work executed on steam-presses is equal to impressions of the same class of work executed upon hand-presses.

In July, 1882, a committee composed of seven experienced officers of the Government, two of whom were from the Bureau of Engraving and Printing, was appointed by the Secretary to consider the relative merits of the Homer Lee and the Milligan steam plate printing presses. The committee reported (Appendix F), among other conclusions, that "the Milligan press has demonstrated, in its work in the Bureau, that it can print certain securities with an acceptable degree of excellence;" and "that the press has executed the impressions done by it at a considerable saving over the hand presses. * * * The committee must, therefore, conclude in favor of the adaptability of this press for certain classes of securities." This committee also rated the backs of notes as work of the third or lowest grade. A minority of the committee, consisting of the two members from the Bureau, though non-concurring in the findings of the majority relative to the Homer Lee press, concurred in all the other statements and recommendations of the majority, including, of course, those concerning the Milligan press. (Appendix G.)

The conclusions of the majority of this committee in favor of the Lee press did not commend themselves to the Chief of the Bureau (Mr.

Burrill) and he accordingly presented to the Department a protest (Appendix H) against the further introduction of presses of this pattern, whose work did not, in his opinion, compare favorably with that of the Milligan presses. In this protest he said:

The Milligan press is * * * a hand-printing press so far as the application of intelligence to the polishing process is concerned, and its condition of work (*sic*) and the standard of the passage of it in its examination are the same as for the hand-presses.

Immediately after I took charge of the Bureau, in May, 1885, the question of the introduction of additional presses of this pattern was referred to me by the Secretary of the Treasury for report. There were then in operation in the Bureau six Milligan presses, which were engaged exclusively in printing 2 and 4 ounce tobacco stamps. The records showed, however, that they had printed acceptably large quantities of the green backs of United States notes at a considerable saving of expense. As, however, there were still a greater saving in printing tobacco stamps on them, the stamps were substituted for the backs of notes when the quantity became sufficient to keep the presses fully occupied.

The unanimous reports in favor of the Milligan presses by all of the committees which had examined them, the favorable judgment that had been expressed concerning them by my two immediate predecessors as Chief of the Bureau, the fact that only a small share of the securities—which experience had amply demonstrated they could print acceptably and economically—was being printed on them, and the further fact that no additional presses of the Lee pattern could be obtained, all constrained me to report to the Department, after full and careful consideration of the subject, that it would be wise policy to acquire more presses of this pattern. I therefore recommended (Appendix I) the purchase of six more Milligan presses. The recommendation was approved by the Department, and the presses were procured and set in operation in the Bureau between November, 1886, and January, 1887.

The printing of the backs of the one-dollar certificates, which had been begun upon the old presses of this pattern, was transferred to the new presses immediately after their introduction. Shortly afterwards the printing of the two-dollar backs was also transferred to them, and more recently the backs of the five-dollar and ten-dollar certificates have, to a greater or less extent, been printed on them. All of the one-dollar backs printed since January 21, 1887, and all of the two-dollar backs printed since April 29, 1887, have been printed on these presses. At present they are printing the backs of all the one-dollar and two-dollar certificates produced by the Bureau. For evidence of the quality of this work it is only necessary to refer to the backs of the certificates of these denominations, which are now being issued at the rate of 148,000 certificates a day. In clearness, sharpness, and uniformity of impression, and all the qualities which tend to prevent successful counterfeiting, they are up to the highest standard. They may lack something of the fullness of color of the very best hand-printing, but this lack is only to be detected by a close comparison of backs printed by the two methods, and is more than compensated for by the superior clearness of the steam-printed impressions.

Soon after the beginning of the current fiscal year it was found that, in consequence of the operation of the provision granting fifteen days' leave of absence to all of the employés of this Bureau, and of the unprecedented demand for tobacco, cigar, and cigarette stamps, the Bureau could not meet the demands upon it with the facilities it then possessed.

As the force of plate-printers was limited by law, under the wise policy of specific appropriations pursued by Congress, the only possible relief was through the introduction of more labor-saving printing-machines (Appendix J). Accordingly, by authority of the Secretary of the Treasury, six additional Milligan machines were bought and set in operation, increasing the number of these machines owned by the Government to eighteen. The new presses were at first applied to the printing of 50-cigar stamps, and afterwards of 2 and 4 ounce tobacco stamps and the backs of silver certificates. The 50-cigar stamps are printed in black ink, which is more difficult to work than the green ink used on the other securities printed by the steam presses, and therefore they do not come quite up to the same standard of excellence as the other securities printed by this process. They do, however, compare favorably with much of the printing of the same class done on hand-presses. Their quality has steadily improved since the first attempt to print them by steam, and there is no doubt that with added experience it will still further improve. These stamps are pasted on boxes of cigars to indicate the payment of the internal-revenue tax, and, from the way in which they are issued and used, are not exposed to the same risk of being counterfeited as notes or bonds.

All of the Milligan presses recently introduced have been procured on the same terms as those previously in use; the Government pays the cost of construction, a royalty of \$500 for the privilege of constructing each press, and a royalty of \$1 for each 1,000 perfect sheets of securities printed thereon. There is an average net saving to the Government of more than \$4 for each dollar of royalty paid. The cost, exclusive of royalty, of the six presses bought in 1886 was \$5,500, and of the six bought in 1887, which were of stronger construction, \$7,500.

As to the comparative merits of steam-printing and hand-printing, it may be said that, speaking in the widest sense, steam-printing is not equal to hand-printing; that is to say, the steam-press has not shown its capacity to print the finest grades of work, such as the black faces of notes, bond, and drafts. This is the conclusion of all the committees which have looked into the subject, and it is accepted by the management of this Bureau. But there is nothing in this conclusion to contravene the demonstrated fact that the machine can and does print acceptably the green backs of notes and certificates, which are in the easiest grade of printing, and which, when done on the hand presses, are intrusted to apprentice boys and the least skillful workmen. If all of this work could be done by hand by the most skillful and conscientious workmen in the most careful manner and under the most favorable conditions, there is no doubt that the printing by that process would best carry out the intention of the engraver; but, taking into account the actual conditions under which work must be done in a large establishment like this, the various degrees of skill and intelligence among its workmen, and the purpose to which the work is to be applied, it is equally clear that the so-called machine plate-printing now being done by this Bureau is as satisfactorily done as if it were intrusted to hand-printers.

Although this press is spoken of as a "steam" press it retains all the advantages of the hand-printing process. Only the purely mechanical parts of the work which require power without special intelligence or skill are done by machinery. The ink, plates, and materials are the same as those used on the presses operated by hand.

Plate printing is separable into four distinct operations: (1) The inking in of the plate by rolling to and fro over it an inking-roller charged

with ink from an inked slab; (2) the wiping of the plate by rubbing it with a thin muslin cloth; (3) the polishing of the plate by rubbing the hand over a cake of whiting and then over the plate until the ink is entirely removed from the smooth surface of the plate and left only in the depressed lines, and (4) the taking of the impression by laying the inked plate face upward on the plank of the press, placing the dampened paper on it, and forcing the plank and plate under an iron roller covered with several layers of thick felting and adjusted at such a height as to force the paper down into the inked lines.

It is evident that all of these operations, except the third, are purely mechanical, and it might be expected that they would be better and more uniformly performed by a well-devised and properly adjusted machine than by hand, especially as the manner and thoroughness with which they are done by hand are left to the judgment of a large number of operatives. The precision and uniformity with which these operations are performed on the steam press show that this expectation is well-founded. The polishing of the plate on the Milligan press is done by hand precisely as on the hand press, with the advantage that the printer works continuously at this process without constantly changing, as on the hand press, from one operation to another. The consequence is that the backs of the certificates printed on the steam presses are, as a rule, more thoroughly polished than those printed on the hand presses.

Four plates are worked at one time on each steam press, being carried around the square frame of the press by an endless chain in such a way that all the plates are subjected to one or the other of the four operations at one time. There is a very short interval between any two consecutive operations, so that there is avoided the loss of time which takes place on the hand presses in moving the plate from the press to the stove on which it is heated and inked, and back again, and in the printer himself passing from one side of the press to the other as each impression is taken. It results from this saving of time that, although each plate on the steam press on an average prints slightly more impressions in a given time than a plate on a hand press, the time devoted to each operation for each impression, as shown by actual timing, is somewhat greater on the steam press than on the hand press. Nor is there any evidence that the steam press impairs the paper and so makes the securities printed on it less durable. While there is no exact way of determining the degree of pressure applied to the paper by the impression roller on either the hand or the steam presses, there is no reason to believe that it is greater on one press than on the other. In both cases the pressure is regulated by the printer, and enough is applied to make the printing full and clear without blurring or "mashing." If too much pressure is applied in either case the ink will be forced out of the lines of the plate and a confused or "mashed" impression produced.

Careful measurement of the sheets immediately before and after printing on the steam-press shows that the paper is not stretched in the least by the operation, and repeated tests by the paper-testing machine of impressions printed by hand and by steam show that the tensile strength of the two does not vary. This machine is devised expressly for testing the strength of paper, and indicates instantly and accurately the tension under which it breaks. The flimsy cotton paper used for the revenue stamps is printed under the same pressure on the steam-presses without injury or perceptible lessening of strength. Competent engineers have computed that but one horse-power is required to operate a steam-press. Much of this power is consumed in running

the bare machinery of the press, and the remainder is divided among the three operations of inking-in, wiping, and making the impression. Four layers of felting, with an aggregate thickness of at least one-fourth of an inch, interpose between the roller and the paper, and any pressure applied to the paper must be exerted through these. The plates pass easily and smoothly under the roller without any perceptible jar. Before a pressure could be applied which would injure the paper, it is probable that the chain which carries the plates would break, or the driving-belt slip or fly off.

The final test, however, of the durability of any issue of securities must be the rapidity with which they return for redemption. The statistics on this point make a most favorable showing for the new silver certificates. The issue of one-dollar notes of the series of 1874 began August, 1874. By June 30, 1875, the end of the fiscal year, there had been issued \$13,797,435. (Finance Report, 1875, p. 483.) At the same time there had been presented for redemption \$1,559,967, (*ibid.*, 488), or 11.3 per cent. of the actual issue. The issue of one-dollar notes of the series of 1875 began in September, 1875, and by the end of the fiscal year the amount issued was \$8,214,193. (Finance Report, 1876, p. 509.) The redemptions at this time had reached \$463,842 (*ibid.*, p. 514), or 5½ per cent. of the amount issued. The issue of one-dollar silver certificates began in September, 1886. By June 30, 1887, there had been issued \$14,156,000, while the redemptions amounted to but \$176,503, or 1½ per cent. (Finance Report, 1887, p. 18.) A tabulated statement will make this comparison even more striking :

Issue.	Issued in first fiscal year.	Redeemed in first fiscal year.	Percentage of redemptions to issue.
One-dollar notes of 1874 -----	\$13,797,435	\$1,559,967	11.30
One-dollar notes of 1875 -----	8,214,193	463,842	5.65
One-dollar certificates of 1886 -----	14,156,000	176,503	1.25

To March 31, 1888, there had been issued \$23,016,000 in one-dollar certificates, and \$14,264,000 in two-dollar certificates. To that date there had been redeemed only \$871,509 in one-dollar certificates, and \$428,110 in two-dollar certificates. The redemptions in eighteen months of an issue of more than 23,000,000 one-dollar certificates were but little more than one-half the redemptions in ten months of an issue of less than 14,000,000 one-dollar notes of the series of 1874.

The records of the Treasury Department may be searched in vain for any other issue of currency which has withstood the wear and tear of circulation so well as these certificates. The issue of small notes had been suspended for more than a year prior to the issue of the small certificates, so that the certificates circulated very actively and were subjected to much more than ordinary wear. On the other hand, the great need of the certificates for current use by the public and the impossibility of supplying at once the deficit in the small circulation have doubtless kept in circulation many certificates which, under ordinary conditions would have been presented for redemption. When the issue of one-dollar United States notes was maintained at about \$25,000,000, the average annual redemptions were from \$8,000,000 to \$10,000,000 (Finance Report, 1887, p. 53), showing that the average life of a note of this denomination is less than three years. There are now outstanding more than 23,000,000 one-dollar certificates. They constitute a mass of paper weigh-

ing 250,000 pounds, and measuring, if piled together, sixty cords, exposed to all the vicissitudes of circulation among 60,000,000 of people. It would be surprising if in this vast mass of paper certificates should not be found in every stage of dilapidation.

The steam printing presses are now printing considerably more than one-third of the work of the Bureau. To replace them with hand-presses would require at least 73 additional printers and 33 additional printers' assistants, and would add \$95,465 to the annual cost of maintaining the Bureau. It would be entirely impossible to provide accommodations for the additional force of operatives in the building occupied by this Bureau. If to this be added the operatives required under the proposed measure to do by the plate process that part of the printing of securities now done by the relief process, the additional force would be swelled to 170 printers, 130 printers' assistants, and 17 other operatives, making a net increase of 295 in the number of employés, and increasing the annual expense \$329,665. Adding the increased expense of printing the postage-stamps by hand, the annual expense resulting from the passage of the bill would be \$352,449.73. This calculation is on the basis of the work now being produced by the Bureau. Under the estimates for the next fiscal year the additional force required would comprise 427 persons, and the additional cost, including the postage-stamps, would be \$436,921.74.

It would be utterly impossible to do by the hand-roller process within this building all the work required for the production of the quantity of securities now being turned out by the Bureau, to say nothing of any prospective increase of production. Many parts of the building are now overcrowded, and some of the employés are compelled to work in rooms not suitable for the purpose. The first step necessary to carry out a requirement that all the printing should be done by hand would be the purchase of additional ground, and the next the erection of a large addition to the building now occupied by the Bureau.

In view of all these considerations I am constrained to report against the propriety and necessity of the proposed provision that all Government securities shall be printed on hand-roller presses.

SHALL THE CHIEF AND ASSISTANT CHIEF BE ENGRAVERS AND
PRINTERS?

Any conclusion as to the propriety and necessity of the provision that the Chief and assistant chief of this Bureau shall be practical engravers or plate-printers must be founded on evidence as to the efficiency or inefficiency of the present incumbents of these offices, neither of whom is a plate-printer or engraver. To enable the committee to form an opinion on this point it is necessary to show how the Bureau of Engraving and Printing has been conducted under its present management.

The last annual report of the Chief of the Bureau shows that while the number of sheets of securities printed increased from 28,217,706 in the fiscal year 1885 to 32,652,207 in 1887, the cost of maintaining the Bureau ran down from \$965,195.47 to \$794,477.90; the average cost of each 1,000 sheets was reduced from \$34.21 to \$24.33, and the average number of employés from 1,133 to 840. During the three fiscal years which ended June 30, 1885, there were produced 91,754,351 sheets of securities, at a cost of \$3,047,483.75. By June 30, 1888, there will have been produced during the three years ending that day at least 97,000,000 sheets of securities, at a cost of about \$2,516,000, to which should be added for purposes of comparison \$36,000 for expenses formerly

charged to the Bureau, but now paid out of other appropriations, making a total of \$2,552,000. About 5,250,000 more sheets of securities will be produced during the three years ending with this fiscal year than in the preceding three years, at a cost \$495,483.75 less.

This favorable showing is in part due to an increase in the relative proportion of the cheaper securities printed, but, after making full allowance for this, there will remain a large increase in production, coupled with a saving in expense of nearly \$500,000. Not more than \$63,000 of this saving is due to the increased use of steam-presses; the remainder is due to economies in the management of the Bureau, the simplifying of the methods of doing business, the discharge of superfluous employés, the abolition of unnecessary places, and the exaction of greater diligence in the discharge of duty, and of a higher standard of qualification. At the same time the quality of the work, especially of the engraving, has been improved; better provision has been made for the health and comfort of the employés; new and improved machinery has been introduced, and the quality of the materials maintained at the highest standard. A just and orderly system of promotion has been followed, and the employés have, as a rule, had more constant employment and better wages, while they have been free from the terror of arbitrary dismissal. Specific appropriations have been secured fixing the amounts to be spent for plate-printing, for other services, and for materials, and the number, grades, and salaries of all the employés have been fixed by law or regulation. These measures have made of the Bureau of Engraving and Printing an orderly, efficient, and reputable business establishment.

The following extract from the report made for submission to the Senate committee to inquire into and examine the methods of business and work in the Executive Departments, furnishes further information on some of the points already touched upon:

The following statement * * * shows the average number of persons employed and the average monthly amount of work performed by the employés in each division of the Bureau in the fiscal year 1885, and in the first eight months of 1887:

Division of branch.	Average number of employés.		Monthly average for each employé.	
	1885.	1887.	1885.	1887.
Engraving	52	31	3.50	4.19
Wetting	39	33	359, 134	392, 588
Hand-presses	499	395	5, 785	6, 625
Steam-presses	26	29	18, 042	18, 050
Surface	32	17	134, 097	145, 261
Examining	94	71	102, 126	140, 669
Numbering	84	65	57, 275	69, 483
Binding	57	53	92, 119	122, 224
Vault	7	5	350, 057	534, 856
Machine	79	47	2.80	3.21
Watch	34	21	-----	-----
Cleaning	47	27	-----	-----
Miscellaneous	74	31	32, 022	84, 136
Total	1, 124	825	-----	-----

The average number of persons employed has been reduced, and the average amount of work done has increased in every division except one. The reduction in force ranges from 7 to 58 per cent., and the increase in the average amount of work done from 7½ to 162½ per cent. * * * The greatest improvement is shown in the divisions not directly connected with the production of securities—the vault, machine, watch, cleaning, and miscellaneous divisions. In these there had been the greatest opportunity and temptation to unduly increase the force, and they therefore presented the best field for retrenchment. Since 1885 the force of these five divisions has been

reduced from 241 to 131, a reduction of 110 persons, or more than 45 per cent. In the miscellaneous division alone the force has been cut down from 74 to 31 persons, while the monthly average for each employé has increased from \$2,022 to \$4,136. The actual effective work done by 31 employés in 1887 was greater than that done by 74 employés in 1885.

The provision that the Chief and assistant chief of the Bureau shall be engravers or plate-printers is inconsistent with itself. The two vocations are utterly diverse in their methods, their training, and the qualifications and intelligence of those who pursue them. Every reason—if a reason could be imagined—why a plate-printer should be chosen militates against the choice of an engraver, and *vice versa*. A plate-printer is a mechanic. Apprenticed to the trade at an early age, without any requirement of education or special intelligence, and spending all his working hours in a narrow mechanical routine, he has little taste or opportunity for the acquirement of general knowledge. It is impossible to conceive what qualification for managing a great and intricate bureau, in which perplexing questions of administration, of legal construction, and of departmental practice are continually arising, and the chief officers of which must have frequent official intercourse with high officers of the Government, would be furnished by skill in performing the purely mechanical operations of plate-printing. Such a craftsman might, indeed, free himself from the trammels of his trade and turn to other pursuits which would qualify him for higher things, but just to the extent he should do so he would fall short of being the “practical” workman required.

An engraver, on the other hand, is an artist, in whom intelligence and fine feeling are essential to high success. But his profession confines him to a range of duties which, however elevating they may be in one sense, do not fit him for administrative work. To the extent that he devotes himself to the one, he disqualifies himself for the other.

The most successful managers of large bank-note printing establishments have not been plate-printers or engravers, but men of business training and administrative capacity, and it would seem to be the true policy for the Government to secure men of like qualifications to manage its engraving and printing establishment. The various branches of the business, such as engraving, plate-printing, surface-printing, and binding, should, of course, be, as they are now, in charge of men skilled in these several specialties, but there is no reason why the executive heads of the establishment should be chosen from any of these trades. The Secretary of the Treasury has now unrestricted power to select for either place the man whom he considers best fitted for it, whatever his calling may be. It would not be for the public interest to restrict the choice to members of a profession or trade which of itself furnishes no guaranty of fitness for the post.

Respectfully yours,

E. O. GRAVES,
Chief of Bureau.

Hon. C. S. FAIRCHILD,
Secretary of the Treasury.

APPENDIX.

A.—REPORT ON MILLIGAN PRESSES.

TREASURY DEPARTMENT,
Washington, D. C., June 9, 1877.

SIR: In accordance with your instructions of May 25, directing us to examine the working of the "Milligan press," and compare the printing done upon it with that done by hand in the Bureau of Engraving and Printing, we have the honor to report: That at 1 o'clock on the 25th day of May we proceeded to the building on the northern corner of Fourteenth and B streets, where the press had been temporarily located, for the purpose of making the experiments and testing its capacity for printing United States notes and other securities of the Government. We took with us four plates of two-dollar United States notes and 500 sheets of distinctive paper for the purpose of making the experiments. Finding that the arrangements for running the press were not complete, we adjourned until the 26th ultimo. On the 26th the committee met again, taking the same plates and paper. The plates not being of uniform thickness it took a long time to pack them up to the same level, and after running off 200 impressions we adjourned until the 28th ultimo. On the 28th ultimo we used the same plates and run off 300 sheets, making a total of 500 sheets. The committee did not consider it a fair test, as the machine is intended to be used with plates ground to a uniform thickness, and the printing of the two-dollar notes was unsatisfactory both to the committee and to the gentleman in charge of the press.

On June 1 we took four plates of five-dollar national-bank currency (faces) in place of two-dollar plates. These plates had been ground by machinery to a nearly uniform thickness. They were placed upon the press and 500 impressions struck off. On the 4th of June we had 100 impressions from the same plates printed by hand in the Bureau of Engraving and Printing. After having the paper dried we examined the impressions printed upon the "Milligan press" with those printed by hand, and found that some of the impressions made upon the press were very good, while others were hardly fair. Those printed by hand were more even and were considered superior to those printed upon the press. To use the press for printing fine work it would be necessary to have the plates of an exact thickness (it being intended to use four plates at a time), and even then, your committee are not entirely satisfied that the work would be quite equal to that done upon the hand-presses.

There are certain classes of work which might be satisfactorily printed upon the press with more economy and more rapidity than by hand-press. A plate-printer with an assistant can print upon a hand-press from 800 to 1,000 impressions per day. We are of the opinion that under favorable conditions from 2,000 to 4,000 impressions could be printed upon the Milligan press per day, but it would require a skilled plate-printer and two girls to run it. It would also require a machinist for every seven or eight presses, as they are liable to get out of order. The press could not be used to advantage by the Government in printing national-bank notes, even though it printed as well as a hand-press, on account of the small number of impressions printed for each bank.

Very respectfully,

GEO. W. CASILEAR.
W. MORGAN.
C. G. EVANS.
J. W. WHELPLEY.
CHAS. H. BROWN.

Hon. JOHN SHERMAN,
Secretary of the Treasury.

B.—REPORT ON NEALE-APPLETON AND MILLIGAN PRESSES.

TREASURY DEPARTMENT, February 26, 1879.

SIR: In compliance with the request contained in your letter of 18th December last, and supplemental letter of the 19th of the same month, that the undersigned act as a committee to examine and report upon the merits of the two machines for printing

from engraved or transferred plates, now in operation in the Bureau of Engraving and Printing, known, respectively, as the Neale-Appleton press, and the Milligan press, the committee have the honor to report:

That they have discharged the duty devolved upon them, and submit the following as the result of their investigation:

The committee continued their inquiries mainly to the two questions submitted, to wit:

First. The character as regards excellence of impressions produced on each press; whether they attain such standard as to justify the printing of United States notes, bonds, national-bank notes, internal-revenue stamps, or checks, or drafts, or either, or both.

Second. The cost of operating each, with a view to determine the relative economy of impressions produced on said presses as compared with those produced on the hand-presses now in use in the Bureau of Engraving and Printing.

In considering the first question, relating to the character of the work from the power-presses, as regards excellence of impression act, after consulting with the representatives of the presses, your committee proceeded as follows:

Several plate-printers employed in the Bureau, who were working upon United States notes, national-bank currency, and internal-revenue stamps, were selected from the list in the office as representing average skilled workmen in their particular classes of printing.

At the close of the day's business, January 9, 1879, the committee took possession of the work done that day by the printers previously selected, and had set aside the various plates from which the work had been printed. One thousand sheets of the work done that day by the power-presses used were also taken, and the plates used in printing them were also set aside. All these impressions were reserved for the use of the committee, and were deposited in the vault set aside for that purpose. The plates that had been in use upon the hand-presses and set aside were then given out from day to day to the different power-presses, and it was required that each press should print at least 250 sheets from each plate.

The plates taken from the power-presses were also given to several plate-printers employed in the Bureau, who were selected to represent the hand-roller presses, and they were required to print 250 sheets from these plates.

As the printing was completed a sub-committee took the sheets in charge, and after marking each sheet with a cipher or private mark, known only to the two members of the subcommittee, the edges were trimmed and all means of identifying the printing from the various presses eliminated, except the ciphers referred to.

The representatives of the power-presses and the superintendent of the printing division of the Bureau were invited to name not more than six experts each, who, together with those selected by the committee, should determine in their opinion the relative excellencies of execution of the various impressions submitted to them from the different presses, and they were also invited to be present during the examination of the impressions by the experts, with the privilege of questioning and cross-questioning them through any member of the committee. In order to facilitate the work of examination, and have a perfectly fair and unbiased opinion from the experts, the impressions from each of the various plates selected were given to each of the experts in lots of 60 sheets. These lots were made up by taking 20 sheets from the 250 sheets from each press, which had been previously marked and prepared, as before stated, and thoroughly mixing them. The experts were requested to carefully examine each and every sheet of a lot, and separate them into three piles, according, in their best judgment, to the degree of excellence of the impressions, the piles to be known as (1) good impressions, (2) passable impressions, and (3) bad or rejected impressions. As each expert concluded the examination of a lot of 60 sheets, a record of the number of sheets in each pile, as determined by him, was made by the committee, the sheets being designated by the cipher or private mark alone.

Some twenty-two experts were examined, and the results tabulated in this manner, each expert considering one lot of 60 sheets from each plate selected. The details of this examination and tabulation are herewith submitted, marked Exhibit A.

From these tables the results of the work of all the experts on each of the different plates selected have been tabulated, and are shown in Exhibit B, herewith submitted.

The following-named persons were selected as experts by the representatives of the Neale-Appleton press, viz: Mr. H. B. Bennett, Mr. A. T. Huntington, Mr. D. R. Nutter, Mr. John Irwin, Mr. G. A. Abbott, and Mr. F. D. Land.

The following by the representatives of the Milligan press, viz: Mr. Baulsir, Mr. D. M. Cooper, Mr. O. T. Edgar, Mr. Edwin Lamasure.

The following by Mr. Morgan, superintendent of the printing division, to represent the plate printers, viz: Thomas H. Little, P. J. Glascott, John E. Braitmeyer, John Hahn, Miss Kate Cogan, Mrs. Mary Mullen.

The following were selected by the committee, viz: Mr. George W. Casilear, Mrs.

Fitzgerald, Mr. Patten, Mr. Whitney, Mr. Underwood, Mr. Neale, Miss Beale, and Mr. W. H. Earle, of the committee.

The following classifications of experts, based on degrees of knowledge, is herewith submitted, together with an analysis of their examination as classed:

First class.—Artistic engravers: Mr. George W. Casilear, superintendent of engraving division of Bureau, forty years' experience; Mr. Daniel M. Cooper, forty years' experience; Mr. W. H. Earle, thirty years' experience.

Second class.—Practical plate printers: Mr. P. J. Glascott, twenty-one years' experience; Mr. John E. Braitmeyer, eighteen years' experience; Mr. Thomas H. Little, fifteen years' experience; Mr. John Habn, seventeen years' experience; Mr. Thomas O. Edgar, thirty years' experience; Mr. Edward Baulsir, twenty years' experience; Mr. Robert Neale, sixty years' experience.

Third class.—Regular examiners of plate printing: Miss A. E. Beale, superintendent of examining division bureau; Mrs. Mary Mullen, examining division, five years' experience; Miss Kate Cogan, examining division, two years' experience, and six years', press-room bureau.

Fourth class.—Persons whose knowledge has been attained by the handling of securities, etc.: Mr. Fitzgerald, with Comptroller of Currency; Mr. Patten, chief redemption division, eleven years; Mr. Edwin Lamasure, clerk in Bureau, twenty years in bank-note company; Mr. G. A. Abbott, transferer in Bureau, nine years; Mr. Whitney, assistant cashier, Treasurer's Office, eleven years; Mr. Underwood, teller, national bank redemption agency; Mr. John Irwin, stamp division, Internal-Revenue Office, formerly of loan branch.

Fifth class.—Those who are familiar with certain classes of Government securities, but who do not claim to be experts as to all classes: Mr. H. B. Bennett, First Comptroller's Office, thirteen years; Mr. F. De Land, loan division, four years; Mr. A. F. Huntington, loan division, twelve years.

The work examined by the experts has been divided into the following classes:

First class includes one-dollar United States face plate No. 107, and 5.5.5.5. Mt. Vernon National Bank, Boston face.

Second class, internal-revenue faces, including 2-ounce tobacco plate No. 8.50; cigars plate No. 19; export distilled-spirit plate No. 2.

Third class, backs and tints, including one-dollar United States back plate No. 79, 10.10.10.10. black back plate, No. 35, Vermont tint, 5.5.5.5. plate No. 356.

The result of the examination by all the experts called before the committee, excepting Mr. Earle, a member thereof, taken in the aggregate, as will be seen in the details by reference to Exhibit C, is as follows:

Of the total number of impressions examined by them, viz, 13,200, there were—

By hand-presses: 2,349 good, 1,724 passable, 388 bad.

By Milligan press: 1,488 good, 1,977 passable, 934 bad.

By Neale-Appleton press: 495 good, 738 passable, 3,107 bad.

Or, stated in per cent.—

By hand-presses: 524 good, 386 passable, .036 bad.

By Milligan press: 335 good, 449 passable, 212 bad.

By Neale-Appleton press: 114 good, 166 passable, 715 bad.

The following is the result of the examination by the separate classes of experts, which is given in detail in Exhibit D:

FIRST CLASS OF EXPERTS.

First-grade work.

Of 120 sheets printed by hand-presses 119 were good or passable, 1 bad.

Of 120 sheets printed by Milligan press 83 were good or passable, 37 bad.

Of 120 sheets printed by Neale-Appleton press 3 were good or passable, 117 bad.

Second-grade work.

Of 305 sheets printed by hand-presses 279 were good or passable, 26 bad.

Of 300 sheets printed by Milligan press 223 were good or passable, 77 bad.

Of 295 sheets printed by Neale-Appleton press 44 were good or passable, 251 bad.

Third-grade work.

Of 179 sheets printed by hand-presses 176 were good or passable, 3 bad.

Of 181 sheets printed by Milligan press 167 were good or passable, 14 bad.

Of 180 sheets printed by Neale-Appleton press 0 were good or passable, 180 bad.

SECOND CLASS OF EXPERTS.

First-grade work.

Of 280 sheets printed by hand-presses 253 were good or passable, 27 bad.
 Of 280 sheets printed by Milligan press 87 were good or passable, 193 bad.
 Of 280 sheets printed by Neale-Appleton press 32 were good or passable, 248 bad.

Second-grade work.

Of 706 sheets printed by hand-presses 597 were good or passable, 109 bad.
 Of 707 sheets printed by Milligan press 526 were good or passable, 181 bad.
 Of 687 sheets printed by Neale-Appleton press 74 were good or passable, 613 bad.

Third-grade work.

Of 421 sheets printed by hand-presses 382 were good or passable, 39 bad.
 Of 422 sheets printed by Milligan press 70 were good or passable, 352 bad.
 Of 417 sheets printed by Neale-Appleton press 20 were good or passable, 397 bad.

THIRD CLASS OF EXPERTS.

First-grade work.

Of 120 sheets printed by hand-presses 119 were good or passable, 1 bad.
 Of 120 sheets printed by Milligan press 72 were good or passable, 48 bad.
 Of 120 sheets printed by Neale-Appleton press 0 were good or passable, 120 bad.

Second-grade work.

Of 304 sheets printed by hand-presses 261 were good or passable, 43 bad.
 Of 301 sheets printed by Milligan press 213 were good or passable, 88 bad.
 Of 295 sheets printed by Neale-Appleton press 56 were good or passable, 239 bad.

Third-grade work.

Of 182 sheets printed by hand-presses 171 were good or passable, 11 bad.
 Of 178 sheets printed by Milligan press 151 were good or passable, 27 bad.
 Of 180 sheets printed by Neale-Appleton press 0 were passable or good, 180 bad.

FOURTH CLASS OF EXPERTS.

First-grade work.

Of 281 sheets printed by hand-presses 276 were good or passable, 5 bad.
 Of 280 sheets printed by Milligan press 227 were good or passable, 53 bad.
 Of 279 sheets printed by Neale-Appleton press 94 were good or passable, 185 bad.

Second-grade work.

Of 728 sheets printed by hand-presses 681 were good or passable, 47 bad.
 Of 695 sheets printed by Milligan press 605 were good or passable, 90 bad.
 Of 677 sheets printed by Neale-Appleton press 316 were good or passable, 361 bad.

Third-grade work.

Of 420 sheets printed by hand-presses 408 were good or passable, 12 bad.
 Of 421 sheets printed by Milligan press 403 were good or passable, 18 bad.
 Of 419 sheets printed by Neale-Appleton press 76 were good or passable, 343 bad.

FIFTH CLASS OF EXPERTS.

First-grade work.

Of 120 sheets printed by hand-presses 118 were good or passable, 2 bad.
 Of 120 sheets printed by Milligan press 102 were good or passable, 18 bad.
 Of 120 sheets printed by Neale-Appleton press 115 were good or passable, 5 bad.

Second-grade work.

Of 314 sheets printed by hand-presses, 285 were good or passable, 1 bad.
 Of 296 sheets printed by Milligan press, 237 were good or passable, 59 bad.
 Of 290 sheets printed by Neale-Appleton press, 255 were good or passable, 35 bad.

Third-grade work.

Of 180 sheets printed by hand-presses, 124 were good or passable, 56 bad.
 Of 179 sheets printed by Milligan press, 132 were good or passable, 47 bad.
 Of 181 sheets printed by Neale-Appleton press, 164 were good or passable, 17 bad.

Separating the experts into two classes, the first including all those named on first, second, and third class, or scientific and technical experts, and the second including those named as the fourth and fifth class, experts having only knowledge from handling securities, the result of their judgment of the work is as follows (see Exhibit E):

FIRST GENERAL CLASS.

First-grade work.

Of 520 sheets printed by hand-presses, 491 were good or passable, 29 bad.
 Of 520 sheets printed by Milligan press, 242 were good or passable, 278 bad.
 Of 520 sheets printed by Neale-Appleton press, 35 were good or passable, 485 bad.

Second-grade work.

Of 1,315 sheets printed by hand-presses, 1,137 were good or passable, 17 bad.
 Of 1,308 sheets printed by Milligan press, 962 were good or passable, 346 bad.
 Of 1,278 sheets printed by Neale-Appleton press, 174 were good or passable, 1,103 bad.

Third-grade work.

Of 782 sheets printed by hand-presses, 729 were good or passable, 53 bad.
 Of 781 sheets printed by Milligan press, 688 were good or passable, 93 bad.
 Of 777 sheets printed by Neale-Appleton press, 20 were good or passable, 757 bad.

SECOND GENERAL CLASS.

First-grade work.

Of 401 sheets printed by hand-presses, 394 were good or passable, 7 bad.
 Of 400 sheets printed by Milligan press, 329 were good or passable, 71 bad.
 Of 399 sheets printed by Neale-Appleton press, 209 were good or passable, 190 bad.

Second-grade work.

Of 1,042 sheets printed by hand-presses, 966 were good or passable, 76 bad.
 Of 991 sheets printed by Milligan press, 842 were good or passable, 149 bad.
 Of 967 sheets printed by Neale-Appleton press, 571 were good or passable, 396 bad.

Third-grade work.

Of 600 sheets printed by hand-presses, 532 were good or passable, 68 bad.
 Of 600 sheets printed by Milligan press, 535 were good or passable, 65 bad.
 Of 600 sheets printed by Neale-Appleton press, 240 were good or passable, 360 bad.
 Of the total number of impressions of all kinds of work examined by the scientific and technical experts they decided that there were—
 By hand-presses: 1,388 good, 969 passable, 260 bad.
 By Milligan press: 652 good, 1,240 passable, 717 bad.
 By Neale-Appleton press: 69 good, 160 passable, 2,345 bad.
 Or, stated in per cent.—
 By hand-presses, .53+ good, .37+ passable, .09+ bad.
 By Milligan press: .249 good, .475 passable, .274 bad.
 By Neale-Appleton press: .026 good, .062 passable, .914 bad.

At the request of the committee the Chief of the Bureau of Engraving and Printing has furnished statements relative to the amount of work provided by the different presses during stated periods, together with the cost of operating the same, which we have summarized, with the following results, viz: The total cost of producing from the hand-roller presses 1,000 impressions, printed with blank ink, has been: For labor, \$9.21; for material, \$2.42. Total, \$11.63.

The cost of producing, in the same manner, 1,000 impressions with green ink has been \$9.21 for labor, for material, \$2.05. Total, \$11.26.

From first day of the month following the date fixed by Mr. Appleton as the date on which he considered his press in full operation, which was September 1, 1878, to December 1, 1878, there were printed upon the same, in black ink, 194,386 perfect impressions and 13,669 imperfect impressions.

The expense incurred in operating the press during the period named was: For labor, \$769; for material, \$643.75; for repairs, \$280.93; total, \$1,693.68. The cost of producing 1,000 perfect impressions was therefore \$87.12. Adding to this the cost of paper upon which imperfect impressions were printed in excess of 1 per cent., allowed by the bureau to hand-roller printers, makes the total cost per 1,000 impressions \$8.84.

From the first day of the month following the date fixed by Mr. Milligan as the date on which he considered his press in full operation, which was August 1, 1878, to December 1, 1878, there were printed upon the same in green ink 194,407 perfect impressions and 3,949 imperfect impressions. The expense incurred in operating the press during the period named was for labor, \$1,099.80; material, \$454.98; repairs, \$115.80; total, \$1,670.08. The cost of producing 1,000 perfect impressions was therefore \$8.59. Adding to this the cost of paper upon which imperfect impressions were printed in excess of 1 per cent., allowed by the bureau to hand-roller printers, makes the total cost of 1,000 impressions \$8.61.

The total number of impressions produced upon hand-roller presses in the Bureau during the six months ending December 31, 1878, was 18,375,005, and as the proportion of the number printed in black ink to the number printed in green ink was about 66 $\frac{2}{3}$ per cent. of the former and 33 $\frac{1}{3}$ per cent. of the latter, the total cost of \$11.63 per 1,000 impressions for black and \$11.26 per 1,000 impressions for green-ink printing was \$211,435.

The total cost if the work had been done upon the Appleton press would have been \$160,046.25, showing a difference in favor of said press of \$51,388.75, which would represent an annual saving of \$102,777.50, exclusive of cost of the presses and any royalty to be paid for their use.

The total cost if the work had been done upon the Milligan press would have been \$157,841.25, showing a difference in favor of said press of \$53,593.75, which would represent an annual saving of \$107,187.50, exclusive of the cost of the presses and any royalty to be paid for their use.

After a very careful, patient, and as thorough an examination as practicable, the committee have arrived at the conclusion, from the facts disclosed by the evidence in our examination of the questions submitted, that the work done by the steam-press does not attain as high a standard as that done by the hand-roller presses.

Especially is this true with reference to those impressions which are required to be in the highest style of the art. The Milligan press approximates more nearly to it, and, in our judgment, several classes of printing might be done on that press in a satisfactory manner, and with considerable saving to the Government. In our judgment there are some classes of printing which do not require the highest style of execution that might be produced on the Neale-Appleton press. An examination of the consolidated tabular statement (Exhibit C), of the evidence as to the excellence of the impressions examined, indicates the judgment of the experts as to the relative merits of all presses under consideration. In the opinion of your committee faces of United States bonds, legal tender notes, and national-bank notes should be executed in the highest style of the art, to guard against counterfeiting, etc., without reference to the difference between the cost of superior and inferior execution.

The question of cost is not to be ignored, of course, and wherever expenditure can be reduced in this work, as it may be done by using steam-presses in printing revenue-stamps and such other classes of work as are not usually printed in the highest style of execution, it should be done.

Upon the question of the prices at which the presses can be purchased respectively we express no opinion, for the reason that the question was not formally submitted to us, and for the further reason that the committee has no data furnished upon which to base an opinion satisfactory to its members. The committee, assuming that invention in the direction of plate-printing by steam-power printing-presses has not yet reached perfection, and that there may be in a short period of time presses constructed on a better plan and able to do better work than either of these two presses, respectfully advise against the purchase of any patent of this kind at the present time, although

it might be to the advantage of the Government to procure a limited number of the steam-presses under consideration, to be used in printing such securities as hereinbefore indicated might be executed thereon.

As the tests in printing by the presses of the sheets examined were made under conditions satisfactory to the owners of the presses, as to method adopted, the number of sheets to be printed, and the plates upon which the printing was done, and with the knowledge that they were printed for this examination, the presumption is that the work was the best they could do; still it may be safely assumed that experience and the progress of improvement in their machines in the future will increase their capacity for the execution of good work. The question of economy is settled beyond dispute by the statistics furnished the committee by the Chief of the Bureau in favor of the steam-presses.

The committee tender their acknowledgment to Col. O. H. Irish, Chief of the Bureau of Engraving and Printing, and to Mr. J. P. Jafferis, an employé of that Bureau, for valuable aid rendered them in conducting this investigation.

We beg to transmit herewith all the documents submitted to and filed with us, a list of which is hereto attached, marked Exhibit E. together with the book of minutes, which contains a record of the proceedings of the various meetings of the committee.

All of which is respectfully submitted.

HIRAM P. BELL,
Chairman.

FRANK L. FREEMAN,
J. FRANKLIN BATES,
E. R. CHAPMAN,
W. H. EARLE,

Committee.

Hon. JOHN SHERMAN,
Secretary of the Treasury.

C.—LETTER AND MEMORANDUM OF O. H. IRISH, CHIEF OF BUREAU, PROPOSING TERMS FOR INTRODUCTION OF MILLIGAN PRESSES.

TREASURY DEPARTMENT,
Bureau of Engraving and Printing, March 27, 1879.

SIR: After a careful consideration of the last propositions of the owners of the Milligan press, I have the honor to say that I would not advise the acceptance of either proposition, but would recommend that the following be submitted to them: That they enter into a contract with the United States to convey the right to make and use, if the Government see fit, five presses, for which they shall be paid the sum of \$500 for each press made and a royalty of \$1 for each 1,000 impressions printed thereon.

This recommendation is made in view of the fact submitted by yourself to examine the subject of steam plate-printing presses, of which Hon. Hiram P. Bell, M. C., was chairman. Their report establishes the fact that there would be economy with the use of these presses upon certain classes of our work, where the cost of operating them is considered apart from the payment of royalty. Ultimately, however, the relative economy of executing the work by hand or power presses will depend upon the amount which the proprietors of the steam-presses demand for the privilege of making them and as royalty for their use. While the committee advised against the purchase of any patent, it was suggested by them that it might be to the advantage of the Government to procure a limited number of the presses to be used in printing such securities as report indicated might be executed thereon. The Bureau is fully equipped with hand-roller presses, and in all probability need not make further outlay for printing-presses for many years. It is obvious, therefore, that to justify any of such presses there must be a substantial saving to the Government in the cost of operating the power-presses as compared with the hand-presses. This would not be the case if very large sums of money should be paid for privileges and royalties. To justify their use and the consequent abandonment of the presses now on hand, the sums to be paid therefor should be adjusted so as to make the cost of the work executed on these presses, including the payment for privileges and royalties, at least 50 per cent. less than the cost of executing the same work upon hand-roller presses.

The proposition recommended can be submitted to the proprietors of the Milligan press as soon as desirable, and the necessary papers be prepared prior to July 1 next, when the appropriation for the next fiscal year becomes available and work on the presses can be commenced, and they can be completed at our convenience and as our resources will permit. It is estimated that it will cost \$3,000 to build them, which, with the amount paid for the privilege, would make the entire cost of placing the five presses in position ready for work, \$6,500.

A proposition covering substantially the same point, and not involving any greater outlay, can be submitted to the proprietors of the Neale-Appleton press whenever they are prepared to consider it. If the proprietors of both the presses should accept the proposition the aggregate expenditure would be but \$11,600, and this amount would be distributed over the entire fiscal year ending June 30, 1880.

Very respectfully,

O. H. IRISH,
Chief of Bureau.

Hon. JOHN SHERMAN,
Secretary of the Treasury.

MEMORANDUM.

This letter indicates a plan for the settlement of the question as to the policy of the Bureau for the present and the next fiscal year in the matter of introducing steam-presses, so distributing the cost as will enable it to make a fair and economical trial without burdening its resources. There is no question but what there will be a sufficient amount of work of lower grades, such as internal-revenue cigar and tobacco stamps, and backs of notes, which can be done upon a number of presses, if introduced, so as to reduce greatly the cost of production.

1.—*Grades of work which can be executed on different presses.*

Press.	Grade of work.	Standard of execution.
Hand-press	All grades.....	Up to Bureau standard.
Milligan press	All grades.....	Good.
Neale-Appleton press	Second and third	Passable.

2.—*Cost per thousand impressions on different presses.*

Press.	Black.	Green.
Hand-press	*11.63	*11.26
Milligan press	18.61	.....
Neale-Appleton press	18.84	.....

3.—*Number of persons required to operate different presses.*

Press.	No. of press.	No. of persons.	Daily pay.	No. of impressions daily.
Milligan	5	18	\$47.00	12,500
Neale-Appleton	5	15	30.00	17,500
Hand $\frac{1}{2}$	20	42	127.00	13,000
Hand $\frac{3}{4}$	27	56	170.75	17,550

DETAILS.

Milligan presses.	Neale-Appleton presses.
1 superintendent	\$5.00
5 printers, at \$5	25.00
10 feeders, at \$1.25	12.50
2 helpers, at \$2.25	4.50
18 Total	47.00
	15 Total
	30.00

* Cost of an average thousand impressions, including all sizes, from the longest bond (18 by 24) to the smallest single note (4 $\frac{1}{2}$ by 9).

\dagger The cost of a thousand impressions substantially from one size of plate only. The above is collated from the report of the committee, and is based on the operation of one of each kind of steam press. The cost is inclusive of labor and material.

\ddagger To accomplish the same amount of work as the Milligan presses.

\S To accomplish the same amount of work as the Neale-Appleton presses.

Hand presses.		Hand presses.	
20 printers, at \$5.....	\$100.00	27 printers, at \$5.....	\$135.00
20 assistants, at \$1.25.....	25.00	27 assistants, at \$1.25.....	33.75
2 messengers, at \$1.....	2.00	2 messengers, at \$1.....	2.00
42 Total.....	127.00	56 Total.....	170.75

The above is a careful estimate of the labor necessary to run five of each of the steam-presses, to be built by this Bureau, and of the labor that could be dispensed with if said presses were running in the Bureau. No item of superintendence is included under hand-presses, for the reason that the hand-room would have to be continued, and no material decrease could be made in the item of superintendence.

D.—REPORT ON LEE PRESS.

TREASURY DEPARTMENT,

Bureau of Engraving and Printing, October 27, 1880.

SIR: The undersigned respectfully beg leave to report that, in accordance with your request of the 8th instant, we called upon Mr. Homer Lee, at No. 60 Cedar street, New York, for the purpose of witnessing the operation of a steam-power printing-press owned by him.

On the occasion of our first visit, on the 21st instant, the press was regularly engaged upon commercial work, and was successfully printing on soft paper from an engraved plate containing a dial-face for clocks. As Mr. Lee was in possession of some bank-note plates, which approximated the work of the Bureau, arrangements were made for the printing of impressions therefrom on bond paper.

On the 23d instant we again visited the establishment, when the face and back plates of a South American bank were printed by the press on Crane's bond paper. The face plate was first printed with black ink, and subsequently the back plates were printed in green ink. The change in plates and of the ink from black to green ink was expeditiously made. The result from both plates was highly creditable. A number of impressions, showing the character of the work executed, are submitted herewith. The press is an automatic printing-machine, performing all the operations necessary to the perfection of a print, including wiping, inking, polishing, and the making of the impressions, and needs only the attention of a pressman to adjust the press and keep it in running order, a "feeder," and a "taker-off."

The conclusions arrived at from the examination made by us are that the press is a very perfect piece of machinery, well adapted to the purposes for which it is intended, *i. e.*, the printing from engraved and transferred plates, and that it can be readily adapted to a very large portion of the work of the bureau.

Very respectfully,

GEO. W. CASILEAR.
THOS. J. SULLIVAN.
W. MORGAN.

Hon. O. H. IRISH,
Chief of Bureau.

E.—REPORT ON OPERATION OF MILLIGAN PRESSES.

TREASURY DEPARTMENT,

Bureau of Engraving and Printing, May 8, 1882.

SIR: As directed by indorsement thereon, I have the honor to submit the following information called for by resolution of the House of Representatives of April 4, 1882:

Plate-printing by steam-power has been, and is now, executed in the Bureau of Engraving and Printing, Treasury Department.

Since January 30, 1878, when a steam-power plate-press was first put in practical operation in the Bureau, until the close of the month of March last, there have been printed on steam-presses of the Milligan pattern, adopted for use in the Bureau, 7,301,847 impressions, against 143,821,296 printed on hand-presses. This shows the proportion of printing done on the steam-presses to be 4.84 per cent., of the aggregate amount executed to the date last mentioned, comprising four years two months and

two days, the period steam-power plate-printing has been employed in the Bureau. As near as can be calculated, the saving effected in that time by the use of such steam-presses is \$45,598.72, exclusive of cost of construction, alterations, and repairs to presses.

Starting one of these steam-presses in 1878, the Bureau has now in operation six of the pattern adopted. On these the variety of work executed is all included in the kinds named in the following table, giving the cost of printing them by steam-presses as compared with the cost of printing the same work on hand-presses, as shown by the records:

Kinds of work printed on steam-presses.	Cost of printing.			
	Total number of impressions printed on steam-presses.	On steam-presses.		On hand-presses.
		Per 1,000 sheets.	Total.	Per 1,000 sheets.
½-barrel beer stamp.....	1,410	\$28.55	\$40.26	\$10.50
100-cigar stamps.....	7,870	14.96	117.74	11.50
50-cigar stamps.....	17,425	15.60	271.83	9.50
National currency, backs.....	264,574	4.68	1,238.21	5.95
2-ounce tobacco, 20 subj.....	325,366	5.03	1,636.59	6.50
United States notes, backs.....	1,413,376	3.35	4,734.81	6.17
Private die stamps.....	6,441	8.32	53.50	10.00
2-ounce tobacco, 40 subj.....	2,553,526	4.40	11,235.51	10.00
4-ounce tobacco, 40 subj.....	2,720,859	5.40	14,692.64	14.00
Total.....	7,310,847	.....	34,021.18	76,372.16

The cost of engraving plates for steam-power presses is the same as for engraving them for hand-presses. There being found, however, an advantage in making the plates a little heavier for the steam-presses, thicker material was obtained for plates for 50-cigar and 2-ounce and 4-ounce tobacco stamps, aggregating 11,906 square inches, costing at the rate of 2½ cents per square inch more than for steel of ordinary thickness, making an extra expense of \$297.65.

The comparative cost of ink, blanket, and every kind of material used to produce 1,000 impressions on the steam-presses as compared with the cost of the same material used for the same work on hand-presses, as shown by the records, is exhibited by the following table:

Kinds of work printed on steam-presses.	Cost of material.			
	Total number of impressions printed on steam-presses.	On steam-presses.		On hand-presses.
		Per 1,000 sheets.	Total.	Per 1,000 sheets.
½-barrel beer stamps.....	1,410	\$1.78+	\$2.51	\$2.49+
100-cigar stamps.....	7,870	2.24+	17.65	3.14+
50-cigar stamps.....	17,425	1.89-	32.90	2.64+
National currency, backs.....	264,574	1.58+	418.27	2.14+
2-ounce tobacco, 20 subj.....	325,366	91+	296.51	1.31+
United States notes, backs.....	1,413,376	1.03-	1,449.98	1.47+
Private die stamps.....	6,441	96-	6.16	1.95+
2-ounce tobacco, 40 subj.....	2,553,526	1.88+	4,804.20	2.70-
4-ounce tobacco, 40 subj.....	2,720,859	2.57-	6,982.54	3.68-
Total.....	7,310,847	.....	14,010.72	20,056.11

The work executed upon these presses is that recognized in the business as of second quality, mainly composed of lettering, lathe, and scroll work, such as backs of notes, certificates, and such stamps as the 2, 5, and 8 ounce tobacco stamps. The excellence of the impressions of this class of work executed on the steam-presses is equal to impressions of the same class of work executed upon hand-presses. It is, however, yet to be demonstrated whether work recognized as of first quality, and requiring the greatest skill and care, can be executed on steam-presses with the same degree of excellence as upon hand-presses. It is believed that the reason why work of

the first quality, which consists mainly of large portraits and fine vignettes, can not be executed with the same degree of excellence on the steam-presses as on the hand-presses, is, that the execution of this class of work needs thought and judgment to adapt the wiping of the plate to the character of the engraving thereon, and to prevent the ink being wiped out of the lines in certain directions. This can be done by a skillful printer wiping the surplus ink from the plate by hand. When, however, this surplus ink is removed by a machine, as it has but one motion, the tendency is to treat all the engraving on the plate alike, and to remove all the ink from the lines following the direction of the wiper.

The experience with steam-presses indicates that plate-printing by this method is adapted to certain classes of the work of the Government not required to be executed to the highest standard adapted for Government securities, and of which a large number of impressions are required; the reason for this last requirement being the fact that these presses need a longer time than the hand-presses to prepare and adjust them for changes of work. Further experience may, however, show that these presses are adaptable to all classes of work.

All these comparisons are based upon the work done on the steam plate-presses of the Milligan pattern actually adopted for use in the Bureau; but during the time these presses have been in operation tests have been made with two other patterns of steam-presses, one the Neale-Appleton, and the other the Homer Lee press. Experiments with the former were continued from February, 1878, until February, 1879, and on the latter from August, 1881, to the present time. As neither of these have been adopted for use in the Bureau, their work has not been considered in the preceding calculations, although the total amount printed by them was 1,120,810 impressions; and if this be included in the proportion of work done on steam-presses, it would increase it to $5\frac{5}{9}\%$ per cent. of all the printing executed during the time steam-power plate-presses have been employed in the Bureau.

Upon the whole, the method by which this work can be best and most economically done is that at present pursued in the Bureau; that is, by the old and established method of plate-printing upon hand-presses, for the work generally, and the gradual introduction and use of presses operated by steam-power, adapted to plate-printing, for such classes of work as experience may demonstrate can be properly executed upon them. In this connection I beg to say that plate-printing, as in the past and as now generally executed, is a laborious, slow, and necessarily an expensive process. It has been for a long time, and is now, a great desideratum to obtain a press which will execute this work by the aid of steam-power.

When, therefore, in 1877 the attention of this Bureau was called to two patterns of presses which, it was claimed, would print from engraved and transferred plates, it was deemed advisable to give their owners every facility to demonstrate the practicability of their machines. These were known respectively as the "Milligan" press and the "Neale-Appleton" press; the Milligan press being designed to make impressions with the assistance of a plate-printer—the machine doing the laborious part of the work—and the Neale-Appleton press being designed to make impressions without the assistance of a plate-printer.

After a preliminary examination to determine whether the presses possessed sufficient merit to warrant their introduction into the Bureau for systematic and practical test of their adaptability to its work, and upon a favorable report of this examination, the two presses were introduced into the Bureau for such systematic and practical test. The experiment with these machines continued with interruptions and varying success from January 30, 1878, to December 18, 1878, when a committee was appointed by the Secretary of the Treasury, consisting of a member of the Committee on Banking and Currency of the House of Representatives, and a representative each of the Bureau of Internal Revenue, the office of the Comptroller of the Currency, the office of the Secretary of the Treasury, and of the Bureau of Engraving and Printing. This committee were instructed to report as to the adaptability of these presses to the work of the Bureau and as to the relative economy of impressions printed thereon as compared with impressions printed on the hand-presses. The report of the committee was submitted February 26, 1879, and the following is the conclusion at which they arrived:

"After a very careful, patient, and as thorough an examination as practicable, the committee has arrived at the conclusion, from the facts disclosed by the evidence in our examination of the question submitted, that the work done by the steam-presses does not attain as high a standard of excellence as that done by the hand-roller presses. Especially is this true with reference to those impressions which are required to be in the highest style of the art. The Milligan press approximates more nearly to it, and, in our judgment, several classes of printing might be done upon that press in a satisfactory manner and with considerable saving to the Government. In our judgment, there are some classes of printing which do not require the higher style of execution that might be produced on the Neale-Appleton press.



"In the opinion of your committee, faces of United States bonds, legal-tender notes, and national-bank notes should be executed in the highest style of the art to guard against counterfeiting, etc., without reference to the difference between the cost of superior and inferior execution.

"The question of cost is not to be ignored, of course, and wherever expenditures can be reduced in this work, as it may be done by using steam-presses in printing revenue stamps, and such other classes of work as are not usually printed in the highest style of execution, it should be done."

Acting upon the report of this committee I recommended to the Secretary, for the purpose of a more extended test of the adaptability of these presses to the work of the Government, that a proposition be submitted to the owners of the presses for the right to make and use five additional presses of each pattern. For this right the Government to pay the sum of \$500 for each press made and used, and a royalty of \$1 for each one thousand impressions which might be printed thereon. In submitting this proposition, the position was taken that, after all, the relative economy of the printing upon hand or steam presses would depend very greatly upon what sums the owners of the patents covering the steam-presses might demand for the right to use them, and that to justify the officers of the Department in abandoning the plant which the Government already possessed, and making an outlay for the construction of new presses and the payment of royalty to the owners of patents, there should be a substantial saving in the cost of operating steam-presses as compared with that of operating the hand-presses. The amount of this saving was placed at 50 per cent. of the cost of operating the hand-presses, it being intended from the 50 per cent. thus saved to pay for the construction of new machines, such royalty as was fair and equitable and still leave a substantial saving to the Government. The proposition was accepted by the owners of the Milligan press, and in January, 1880, a contract was made with them by the Secretary of the Treasury on the expressed agreement that the right to make and use these presses was for the purpose of a more thorough test of the adaptability of the press to the work of the Government. Owing to a want of harmony between the owners of the Neale-Appleton press, the proposition was not accepted by them, and as they failed to operate the press that was then in the Bureau, it was finally dismantled, boxed, and is now stored in the Bureau for the owners.

The new presses of the Milligan pattern were finished, and have been in continuous operation since December 15, 1880, and it is upon the results obtained with them, in addition to the press originally introduced into the Bureau, that the foregoing report is based.

It has been the aim in their operation to secure the best results by confining them to that class of work which they have been found best adapted to, and but little or no test has therefore been made as to their adaptability to the higher grades of work.

With reference to the introduction of additional presses of this pattern, it would appear to be unwise to make any very radical change in the method of executing the work of plate-printing required by the Government.

As the Government is bound to afford the public the amplest security against the reproduction of its securities, stamps, etc., by counterfeiters, its notes, bonds, and other representatives of money value should be executed to the highest standard that it is possible to attain, irrespective of any saving that could be effected by the use of methods which might produce inferior work. And while conceding that there are certain classes of Government work which can be safely executed upon steam-presses, it should be remembered that the inventive genius of the country is constantly making improvements in all machinery, and it would, therefore, be prudent not commit the Government to any particular pattern of printing-press.

There is now being experimentally operated in the Bureau a steam-power plate printing-press, known as the Homer Lee press, which is designed to produce impressions without the aid of a plate-printer. During the period that it has been in operation it has very fairly printed impressions of the same character of work as that executed upon the other steam-presses, but before making any expression of opinion as to the character for excellence of the impressions so made, or as to whether they are fully up to the standard required for the work of the Government, I deem it proper that the work of this press should be subjected to the same tests that the work of the Milligan and the Neale-Appleton presses were subjected to, and that the question of the adaptability of this press to the work of the Government should be determined by a committee to be appointed by yourself, which might be constituted of representatives of the same interests as the committee that examined those presses.

The resolution of the House of Representatives is returned herewith.

Very respectfully,

O. H. IRISH,
Chief of Bureau.

Hon. CHARLES J. FOLGER,
Secretary of the Treasury,

S. Mis. 2-24

F.—REPORT ON LEE AND MILLIGAN PRESSES.

TREASURY DEPARTMENT, April 30, 1883.

Sir: The committee designated in your letter of July 10, 1882, to consider and report concerning the subjects therein mentioned in relation to the presses in use in the Bureau of Engraving and Printing for the printing of Government securities, has the honor to submit the following report:

The subjects enumerated in your letter may be considered under four heads, namely:

(1) The excellence of the impressions produced by the press known as the "Homer Lee press," and whether they reach such a standard as to justify the printing of United States notes, national-bank notes, bonds, and the plate impressions necessary to the production of checks and drafts and internal-revenue stamps.

(2) If the conclusions shall be favorable as to this press for all or any of the kinds of work mentioned, to report as to the relative economy of executing said work on the "Homer Lee press" and upon other presses in use by the Bureau of Engraving and Printing for the production of impressions by plate-printing or by the relief process, whether operated by hand or steam power.

(3) After a careful comparison of the work executed by the several presses in use, and of the durability of each press, and of the cost of construction, alterations, repairs, and all other expenses since their introduction, to report whether it is for the interest of the Government to discontinue in whole, or in part, the use of the hand-presses, and which, if any, of the steam-presses it is for the interest of the public service to use for the printing of the issues and miscellaneous securities of the Government, or whether each of the several kinds could be used to advantage, and, if so, how many of each.

(4) Such other recommendations relative to the use of hand-presses and steam-power plate-printing presses as may be deemed necessary and proper.

(1) *Excellence of impressions.*—In proceeding to determine the excellence of the impressions produced by the "Homer Lee press," the committee, on inquiry, learned that this press in its work in the Bureau of Engraving and Printing prior to the beginning of this examination had only executed impressions of United States note backs, national-bank-note black backs, and 8-ounce tobacco and 50-cigar internal-revenue stamps. It was therefore decided, for the purpose of making a comparison of the printing of this press with that of the "Milligan press" and the hand-presses now in operation in the Bureau, to have a number of impressions printed by each of the presses of all grades or classes of the securities issued by the Government. A plan (see file No. 4) was agreed upon by the committee and assented to by the patentees of the two steam-presses under consideration, and Mr. James R. English, the representative of the plate-printers, working on the hand-presses.

In accordance with this plan the following impressions were printed by each of the steam presses and by the hand-presses, and classified by the committee for the expert examination under three heads, namely:

First-grade work.

- 100 impressions of faces of \$1 United States notes.
- 100 impressions of faces of \$2 United States notes.
- 100 impressions of faces of 10, 10, 10, 20 national-bank notes (1875's).
- 100 impressions of faces of 50, 100 national-bank notes (1875's).
- 100 impressions of faces of 5, 5, 5, 5 national-bank notes (1882's).
- 48 impressions of faces of \$50 United States registered bonds.
- 48 impressions of faces of \$50 pension checks.
- 48 impressions of faces of \$50 $\frac{1}{2}$ -pound tobacco stamps.

Second-grade work.

- 100 impressions, black backs, 10, 10, 10, 20 national-bank notes (1875's).
- 100 impressions, black backs, 50, 100 (1875's).
- 48 impressions of faces of $\frac{1}{2}$ -barrel beer stamps.
- 48 impressions of faces of 50-cigar stamps.
- 48 impressions of faces of 100-cigar stamps.
- 48 impressions of faces of 20 cigarette stamps.
- 48 impressions of faces of Swift & Courtney & Beecher Co. private-die stamps.

Third-grade work.

- 100 impressions of backs of \$1 United States notes.
- 100 impressions of backs of \$2 United States notes.
- 100 impressions of tints of 10, 10, 10, 20, national-bank notes (1875's).
- 100 impressions of tints of 50, 100, national-bank notes (1875's).
- 100 impressions of tints of 5, 5, 5, 5, national-bank notes (1882's).
- 48 impressions of tint and seal of \$50 United States registered bonds.

48 impressions of backs of \$50 United States registered bonds.

48 impressions of 8-ounce tobacco stamps.

The patentees of the steam presses and the representative of the plate printers, under the privilege granted by the committee, each selected three experts, one for each grade of work, and the committee selected two experts for each grade of work. All of the experts, with one exception, were at the time of the examination employees in the Bureau of Engraving and Printing. They were as follows:

From the engraving division.—Mr. George W. Casilear, superintendent; Mr. David M. Cooper and Mr. Lorenzo J. Hatch, engravers; Mr. Edward Shaffer, transferer, and Mr. George W. Tichenor, geometrical-lathe operator.

From the examining division.—Miss Annie E. Bealle, superintendent; Miss Annie Hussey, assistant superintendent; Mrs. Josephine S. French, Mrs. Alice Heaton, Miss Ellen Carey, Miss Kate Cogan, Miss Jennie Freeland, Miss Jane Willis, and Mrs. Belle R. Dewey, formerly assistant superintendent.

From the printing division.—Mr. Ward Morgan, superintendent, and Mr. John E. Braitmayer, Mr. Robert Dalton, and Mr. Jeremiah J. Finnegan, plate printers.

With this arrangement each particular set of impressions received the examination and classification of five experts, according to the excellence of the work as defined by the committee (see File No. 34) as follows:

First. The grade of superior quality of printing and registering was called "good."

Second. The grade not of a superior quality of printing or registering, but acceptable in the ordinary operations of the Government, was called "passable."

Third. And the grade unfit for issue, by reason of the inferior quality of the printing or registering, was called "rejected."

The judgments of the experts upon the impressions submitted to them were recorded by the committee in tabular form, and will be found in detail in files 93 to 142. A summary of this examination is shown in the following table, taking the average, first of the finding of the five experts who examined and classified each set of impressions, and then the average of all the experts who examined and classified all of the impressions arranged in each grade of work:

First-grade work.

Description of work.	Number of impressions by each press.	Milligan press.		Homer Lee press.		Hand-presses.	
		Good and passable.	Rejected.	Good and passable.	Rejected.	Good and passable.	Rejected.
U. S. notes, ones, face.....	100	20.40	79.60	.80	99.20	93.20	6.80
U. S. notes, twos, face.....	100	20.20	79.80	.....	100.00	80.80	19.20
N. B. notes, 10, 10, 10, 20, face.....	100	22.40	77.60	.80	99.20	94.40	5.60
N. B. notes, 5, 5, 5, 5, face.....	100	16.40	83.60	.....	100.00	94.00	6.00
N. B. notes, 50 and 100, face.....	100	23.20	76.80	14.00	86.00	86.80	13.20
U. S. bond, fifties, face.....	48	8.20	39.80	4.20	43.80	44.60	3.40
U. S. pension check, face.....	48	25.20	22.80	36.20	11.80	47.40	.60
½-pound tobacco stamp, face.....	48	7.00	41.00	.....	48.00	43.00	5.00
Total.....	644	143.00	501.00	56.00	588.00	584.20	59.80
Rate per 100 sheets.....	100	22.20	77.80	8.69	91.31	90.71	9.29

Second-grade work.

Description of work.	Number of impressions by each press.	Milligan press.		Homer Lee press.		Hand-presses.	
		Good and passable.	Rejected.	Good and passable.	Rejected.	Good and passable.	Rejected.
N. B. notes, 10, 10, 10, 20, back.....	100	76.40	23.60	43.40	56.60	93.20	6.80
N. B. notes, 50 and 100, back.....	100	92.60	7.40	62.40	37.60	87.60	12.40
½-barrel beer stamp, face.....	48	44.80	3.20	.....	48.00	46.60	1.40
50-cigars stamps, face.....	48	35.40	12.60	6.60	41.40	46.40	1.60
100-cigars stamps, face.....	48	37.80	10.20	16.60	31.40	45.60	2.40
20-cigarettes stamps, face.....	48	35.00	13.00	9.40	38.60	46.00	2.00
Swift, Courtney & Beecher, private-dio stamps, face.....	48	44.40	3.60	30.40	17.60	47.00	1.00
Total.....	440	366.40	73.60	168.80	271.20	412.40	29.60
Rate per 100 sheets.....	100	83.27	16.73	38.37	61.63	93.73	6.27

Third-grade work.

Description of work.

	Number of im- pressions by each press.	Milligan press.	Homer Lee press.	Hand-presses.			
	Good and passable.	Rejected.	Good and passable.	Rejected.			
	Good and passable.	Rejected.	Good and passable.	Rejected.			
U. S. notes, ones, backs	100	87.20	12.80	19.00	81.00	99.20	.80
U. S. notes, twos, backs	100	88.80	11.20	13.60	86.40	98.40	1.60
N. B. notes, 10, 10, 10, 20, tint	100	66.00	34.00	1.00	99.00	97.00	3.00
N. B. notes, 5, 5, 5, tint	100	94.60	5.40	60.80	39.20	96.80	3.20
N. B. notes, 50 and 100, tint	100	88.40	11.60	36.00	64.00	95.60	4.40
U. S. bond, fifties, back	48	44.20	3.80	9.80	38.20	47.60	.40
U. S. bond, fifties, tint and seal	48	7.80	40.20	9.60	38.40	47.80	.20
8-ounce tobacco stamps, face	48	25.00	23.00	13.00	35.00	47.00	1.00
Total	644	502.00	142.00	162.80	481.20	629.40	14.60
Rate per 100 sheets	100	77.94	22.06	25.27	74.73	97.73	2.27

Registration grade of work.

Description of work.

	Number of im- pressions by each press.	Milligan press.	Homer Lee press.	Hand-presses.			
	Good and passable.	Rejected.	Good and passable.	Rejected.			
	Good and passable.	Rejected.	Good and passable.	Rejected.			
U. S. notes, ones, face, reg	100	97.20	2.80	99.80	.20	98.60	1.40
U. S. notes, twos, face, reg	100	98.20	1.80	99.20	.80	100.00	.....
N. B. notes, 10, 10, 10, 20, face, reg	100	89.80	10.20	85.80	14.20	97.40	2.60
N. B. notes, 10, 10, 10, 20, tint, reg	100	95.40	4.60	95.00	5.00	97.60	2.40
N. B. notes, 5, 5, 5, face, reg	100	79.20	20.80	98.80	1.20	100.00	.....
N. B. notes, 50 and 100, face, reg	100	91.86	8.20	77.20	22.80	99.00	1.00
N. B. notes, 50 and 100, tint, reg	100	97.40	2.60	85.60	14.40	96.40	3.60
U. S. bonds, fifties, face, reg	48	45.80	2.20	46.80	1.20	47.60	.40
U. S. bonds, fifties, tint and seal, reg	48	47.20	.80	48.00	.....	47.00	1.00
$\frac{1}{2}$ -barrel beer stamps, face, reg	48	46.00	2.00	45.20	2.80	48.00	.....
$\frac{1}{2}$ -pound tobacco stamps, face, reg	48	42.60	5.40	47.40	.60	48.00	.....
Total	892	830.60	61.40	828.80	63.20	879.60	12.40
Rate per 100 sheets	100	93.12	6.88	92.91	7.09	98.61	1.39

During the progress of printing the impressions the patentee of the "Homer Lee press," in a letter to the committee (see file No. 35) called attention to the appearance of ink spots on some of the impressions printed by his press, which he claimed to be caused by irregularities or depressions in the surfaces of the plates; and stated that in the regular work of that press all such irregularities and depressions would be removed before printing by "tapping up" the plate; but as the same plates had been used by the "Milligan press" and the hand-presses in producing their parts of the required test impressions, the committee could not permit the plates to be altered for this press under the plan adopted by the committee and assented to by the representatives of the different presses.

When all of the impressions were produced in accordance with the adopted plan, the committee gave the patentee of the "Homer Lee press" the privilege of "tapping up" the plates used for printing the 10, 10, 10, 20 faces of national-bank notes and the $\frac{1}{2}$ -barrel internal-revenue beer stamps, and then printing 100 impressions from the former and 48 impressions from the latter. These impressions were submitted to five experts, and their examination and classification resulted as is shown in the following table:

Description of security	No. of im- pressions.	Good and passable.	Rejected.
N. B. note, 10, 10, 10, 20, face	100	88.40	11.60
$\frac{1}{2}$ barrel beer stamps	48	9.60	38.40

The committee decided to carry the examination further, and for this purpose procured from the office of the Comptroller of the Currency 25 impressions of black backs of five-dollar national bank notes printed by each of the presses, and from the bind-

ing division of the Bureau of Engraving and Printing 100 impressions of 50-cigar stamps printed by each of the presses. These impressions were selected at random and represented printed work which, in the first case, had been passed and accepted and was held ready for issue; and, in the second case, which had been finally passed by the examiners in the Bureau of Engraving and Printing and was ready for delivery and issue, so far as the printing was concerned. These impressions were submitted to five of the experts who had examined and classified the work first printed, and their judgment as to the quality of the printing is shown in the following table:

Press.	N. B. notes, 5, 5, 5, 5, black backs.			50-cigar stamps.		
	Good and passable.	Rejected.	Total.	Good and passable.	Rejected.	Total.
Hand-presses	20.40	4.60	25	86.80	13.20	100
Milligan press	4.00	21.00	25	49.40	50.60	100
Homer Lee press	24.40	.60	25	72.20	27.80	100

Upon his request the patentee of the "Homer Lee Press" was granted the privilege of having a plate for printing first-grade work and a plate for printing second-grade work, as classified by the committee, properly adjusted to his press and to print from each of them a day's work. The plates selected for this purpose were for face of five-dollar United States notes and for 50-cigar stamps.

The impressions printed from these plates were submitted to five of the experts for examination and classification as to the quality of the printing and the result of their judgments is given in the following table:

Description of work.	Total number of impressions.	Good and passable.		Rejected.
			Rejected.	
U. S. notes, fives, faces	2,614	2,244		370
50-cigar stamps	4,006	3,986		20

An examination of the records of the Bureau of Engraving and Printing (see File No. 165) of the impressions of the same securities produced by the hand-presses and the two steam-power presses during a period of one month shows the spoilage to average as follows:

Description of work.	Hand-presses.	Homer Lee press.		Milligan press.
		Per cent.	Per cent.	
8-ounce tobacco stamps	2	.9	(*)	
50-cigar stamps	1½	2.1	3.3	
N. B. notes, 5, 5, 5, 5, black backs	1½	1.9	4.3	

A calculation based on a statement furnished by the Chief of the Bureau of Engraving and Printing (see File No. 152, Exhibit A) of the percentage of spoilage of all of the impressions of the several securities printed by the Homer Lee press from September 1, 1881, to June 30, 1882, and by the Milligan press from December 15, 1880, to June 30, 1882, and of the impressions of national-bank-note black backs printed by the Milligan press from April 1 to September 30, 1879, is shown in the following table:

Description of work.	Homer Lee press.		Milligan press.
	Per cent.	Per cent.	Per cent.
2-ounce tobacco stamps	(*)		1.4
4-ounce tobacco stamps	(*)		1.3
8-ounce tobacco stamps		1.1	(*)
40-cigar stamps		3.1	6.9
N. B. notes, 5, 5, 5, 5, black backs		2.3	4.3
U. S. notes, faces	(*)		14.8
U. S. notes, backs	(*)		1.8

* None printed.

The spoilage of the work done by the Milligan presses, from July 1, 1882, to March 31, 1883, was on 2-ounce tobacco stamps 0.9 per cent.; on 4-ounce tobacco stamps, 1 per cent., and on 50-cigar stamps, 1.8 per cent.; and the spoilage of work done by the Homer Lee press during the same period of time was, on the 50-cigar stamps, 1.6 per cent. (See File 197.)

The committee appreciates that there is no little difficulty in drawing a conclusion as to the excellence of the impressions produced by the Homer Lee press from the evidence before it.

The testimony presented by the examination of the experts shows that difference of opinion which is generally a characteristic of this kind of evidence. In several instances the opinions of the experts are directly antagonistic. In arriving at a conclusion the committee can not disregard the fact that the first experience of this press in the printing of the highest grade of securities was in the preparation of the impressions for this test; and that with further experience much better results would most probably be obtained.

All of the experts selected to examine the impressions are persons who have had more or less experience in the examination or printing of Government securities; and most of them are persons whose present duties are in connection with the examination of securities in the Bureau of Engraving and Printing. But it is believed that the examination given to the impressions printed for the committee was very much more critical than that given to the impressions produced in the ordinary work of printing securities; and that the experts adopted a much higher standard than that established and followed in the Bureau of Engraving and Printing for examining the regular work of the Bureau. This belief is supported by the testimony of several of the experts who examined the impressions and in whose opinion the committee has confidence. (See Files Nos. 144 to 148.)

The average spoilage of the work (see File No. 165) done in the usual course of business by the hand-presses is, for first-grade work, 2½ per cent.; for second-grade work, 1.1 per cent., and for third-grade work, 2 per cent.

The average spoilage of the impressions (see File No. 142) printed by the hand-presses for the test prescribed by the committee, as found by the experts who examined the impressions, is, for first-grade work, 9.3 per cent.; for second-grade work, 6.3 per cent., and for third-grade work, 2.3 per cent.

These facts are regarded as sufficient evidence to show that the standard by which the test impressions were judged was not the standard ordinarily used in passing the securities, and was such as could not with economy be adopted in the practice of printing general securities for the purposes of the Government. One of the most experienced experts stated (see File No. 144, page 18) that he did not think it would be practicable, in his judgment, to operate an establishment of the magnitude of the Bureau of Engraving and Printing and print the general average of the accepted work up to the standard adopted by him in examining the impressions submitted to him by the committee.

The securities printed by the Homer Lee press prior to July 1 last, being national-bank note black backs, 50-cigar stamps, and 8-ounce tobacco stamps, belong to the second and third grades of work as classified by the committee.

Considering the acceptable character of this work for the practical purposes of the Government, as is evidenced by the low rate of spoilage in the production of the impressions and the results of the several tests in the work of the press, as detailed above, the committee expresses the conclusion that this press can produce the securities embraced within the classification of second and third-grade work. The specific securities mentioned in these grades are taken as representatives of a large number of securities having the same general characteristics of engraving. Some of these may be more and some less difficult of execution; but it is believed that the press can print all of them with the degree of excellence in the impressions which is required for the security of the Government.

As stated in the beginning of the report, this press had not had the opportunity of working on the highest grade of securities prior to the printing of the impressions produced for the special use of the committee. The press must, therefore, have failed absolutely in the test before the committee could declare that it can not print the securities represented by those enumerated as first-grade work. The impressions of pension-checks produced by the press were classed, on examination (see File No. 99), as follows:

Experts.	Good.	Passable.	Rejected.
First expert.....	44	1	3
Second expert.....		18	.....
Third expert.....			48
Fourth expert.....	23	17	8
Fifth expert.....	2	46	.....

The face impressions of the 10, 10, 10, 20 national bank notes produced by this press in the second printing after the plate had been "tapped up" to remove the irregularities and depressions on its surface, which it was claimed, caused imperfections in the impressions of the first printing were classed (see file No. 120) by the experts as follows:

Experts.	Good.	Passable.	Rejected.
First expert.....		94	6
Second expert.....	2	94	4
Third expert.....		89	11
Fourth expert.....	57	37	6
Fifth expert.....		69	31

In the examination of the impressions first printed from this plate the average rejection of the five experts was 9.2 per cent. After the plate was prepared by the process of "tapping up," the average rejection of five experts was 11.6 per cent.

The amount and character of the engraving on the plates for printing the securities classed as first-grade work render some of them more difficult to print than others. The tests made for the committee, which was the first trial of the press upon work of this grade, lead the committee to believe that with experience the press could execute some of these securities with the required degree of excellence in the impressions.

The committee is of opinion that Messrs. George W. Casilear, Thomas J. Sullivan, and Ward Morgan were justified in the conclusions reached in their report of October 27, 1880, "that the press is a very perfect piece of machinery, well adapted to the purposes for which it is intended, *i. e.*, the printing from engraved and transferred plates, and that it can be readily adapted to a very large portion of the work of the Bureau" (see File No. 25, Ex. Doc. 224, page 35), and that the press, which was introduced into the Bureau of Engraving and Printing upon this report, has by its work verified the judgment that it could be "readily adapted to a very large portion of the work of the Bureau."

The impressions produced by the Homer Lee press present a uniform appearance; the engraving on the plates is represented with fidelity, and the lines are clear and distinct. The press performs all of the operations of inking, wiping, and polishing the plates, thus dispensing with the services of a plate-printer for that purpose. The automatic polishing of the plate is, in the opinion of some, the gravest objection to the work of the press, and presents the greatest difficulty in the execution by it of impressions with the degree of excellence required, but if an engraving be faithfully represented and the impression possess that color which may be considered as necessary for security, the presence or absence of a greater degree of color is a question which may properly be said to lie within the region of taste, and critics of equal culture may be found ranged on both sides, some preferring a strong, rich color, and others a light, clear color.

The performance of all of the operations by this press, and particularly the polishing of the plate, requires that the plates used on the press be engraved with a smooth, even surface, free from irregularities and depressions. The press does not require any peculiar engraving for the plates; but it needs the assistance and co-operation of the transferer and a skillful cleaner in the preparation of the plates. A plate prepared for this press with a view to meet the requirement for a smooth, even surface, could be worked by a plate-printer on a hand-press; and he could do more and better printing on it, with less labor, and at less cost for ink and other materials.

The conclusions of the committee, as to the adaptability of this press for any class of printing, are based upon the condition that the plates be put in proper order for the press. That this is perfectly feasible has been demonstrated in the regular work of the press in the Bureau, and especially in the tests made for the information of the committee. It can be attained in the preparation of the plates by bestowing a little more than the usual time and care in transferring, tapping up, and burnishing the plates. The additional expense involved in the preparation of the plates in this manner is insignificant compared with the saving effected by the press using the plates.

(2) *Relative Economy.*—In compliance with a request from the committee, the Chief of the Bureau of Engraving and Printing furnished a statement (see File No. 122, Exhibit A) showing the number of impressions of all classes of securities produced on the steam presses now in operation in the Bureau, from the date of the introduction of the first Milligan press to the 30th of June, 1882, and also the cost of producing the impressions. This statement purports to embrace all of the impressions printed

on these presses with the exception of the number produced by four of the presses constructed by the Government of the Milligan pattern during a few days preceding December 15, 1880.

From this statement it is learned that the six Milligan presses from December 15, 1880, to June 30, 1882, and Milligan press No. 1, from April 1 to September 30, 1879, produced the following impressions at the cost for materials and the average cost per thousand impressions, as shown :

Description of work.	Impressions.		Cost of production.				Average cost per 1,000 impressions.
	Perfect.	Imperfect.	Labor.	Ink.	Repairs.	Other materials and royalty.	
U. S. notes, backs	236,783	4,246	\$821.76	\$165.59	\$101.56	\$418.16	\$6.26
U. S. notes, faces	12,245	2,117	60.72	17.84	4.73	29.76	7.87
2-ounce tobacco stamps ..	2,984,923	41,440	14,059.66	3,724.99	727.37	5,648.87	7.99
4-ounce tobacco stamps ..	3,138,205	42,544	15,096.13	5,467.84	817.89	6,304.77	8.71
50-cigar stamps	60,499	4,492	295.51	99.77	4.10	132.95	8.20
N. B. notes, black-backs ..	253,099	11,075	1,044.48	328.80	141.45	572.49	7.89

The statement also shows that from September 1, 1881, to June 30, 1882, the "Homer Lee press" produced the following impressions, at the cost for materials and average per thousand impressions as stated :

Description of work.	Impressions.		Cost of production.				Average cost per 1,000 impressions.
	Perfect.	Imperfect.	Labor.	Ink.	Repairs.	Other materials and royalty.	
50-cigar stamps	314,772	9,818	\$813.25	\$304.94	\$27.60	\$608.37	\$5.41
8-ounce tobacco stamps ..	315,404	3,396	888.57	240.81	21.22	575.14	5.40
N. B. notes, black-backs ..	234,920	5,410	602.08	150.91	14.84	413.75	4.92

The following table, calculated from the statement of the Chief of the Bureau of Engraving and Printing, gives a comparison of the cost per thousand impressions of producing work on the hand-presses and the steam-power presses, showing separately the cost for each item that enters into the production :

[(*) indicates no printing by press.]

Description of work.	Hand-presses.			Milligan press.			Homer Lee press.					
	Total average cost per 1,000.	Cost of ink.	Cost of other materials.	Cost of labor.	Total average cost per 1,000.	Cost of ink.	Cost of other materials.	Cost of labor.	Total average cost per 1,000.	Cost of ink.	Cost of other materials.	Cost of labor.
U. S. notes, backs	\$7.69	\$0.79	\$0.78	\$6.00	\$6.26	\$0.69	\$0.65	\$3.41	(*)	(*)	(*)	(*)
U. S. notes, faces	10.36	1.46	.78	8.00	7.87	1.25	.84	4.23	(*)	(*)	(*)	(*)
8-ounce tobacco stamps ..	10.44	1.29	1.03	8.00	-----	-----	-----	-----	\$5.40	\$0.73	\$0.62	\$2.79
4-ounce tobacco stamps ..	17.90	1.98	1.80	14.00	8.71	1.72	.81	4.75	(*)	(*)	(*)	(*)
2-ounce tobacco stamps ..	12.92	1.45	1.35	10.00	7.99	1.24	.76	4.65	(*)	(*)	(*)	(*)
50 cigar stamps	12.36	1.53	1.21	9.50	8.20	1.54	.85	4.55	5.41	.95	.60	2.51
N. B. notes, black-backs ..	8.86	1.46	.78	6.50	7.89	1.24	1.04	3.95	4.92	.63	.50	2.51

In this table the "total average cost per 1,000 impressions" includes, in addition to the items above expressed, in the case of the hand-presses the cost of repairs, and in the cases of the steam-presses the cost of repairs, power, and royalty.

The following table shows a comparison of the average cost per 1,000 impressions of securities printed by the hand-presses and the steam-presses, and the average saving effected by the steam-presses :

[(*) indicates no printing done by press.]

Description of work.	Total average cost of producing 1,000 impressions.			Average saving over the hand-presses by the—		Average saving of the Homer Lee press over the Milligan press.
	Hand-presses.	Milligan press.	Homer Lee press.	Milligan press.	Homer Lee press.	
U. S. notes, backs	\$7.69	\$6.26	(*)	18+	(*)	(*)
U. S. notes, faces	10.36	7.87	(*)	24+	(*)	(*)
N. B. notes, black-backs	8.86	7.86	\$4.92	11+	44+	37+
50-cigar stamps	12.36	8.20	5.41	33+	56+	34+
2-ounce tobacco stamps	12.92	7.99	(*)	38+	(*)	(*)
4-ounce tobacco stamps	17.90	8.71	(*)	51+	(*)	(*)
8-ounce tobacco stamps	10.44	(*)	5.40	(*)	48	(*)

The figures given in this table are calculated from the statement furnished by the Chief of the Bureau of Engraving and Printing. From this statement it is learned that the charge for steam-power made to the Homer Lee press is 80 cents, and to each of the Milligan presses 35 cents per working day of eight hours. These charges are regarded as excessive, and especially so in the case of the Homer Lee press.

The honorable Secretary of the Navy, at your request, detailed two naval engineers to assist the committee in determining the durability and cost of construction of the steam-power presses, and the power required to operate them. The experiments made by these officers (see file No. 83) disclosed the fact that neither of the presses requires a horse-power for its proper operation, and that the average cost of producing a horse-power with an engine of large capacity, such as that in use in the Bureau of Engraving and Printing, is about 12 cents per day of eight hours. The committee therefore concluded that the average cost per 1,000 impressions given above should be subject to a deduction of 17 cents in case of the Homer Lee press, and 8 cents in case of the Milligan press.

The comparison made between the hand-presses and the steam-presses as to the percentage of saving effected by the steam-presses is based upon one Homer Lee press and six Milligan presses in operation; and the whole charge for superintendence and for labor is in the one case borne by one press, and, in the other, it is divided among six. On the basis of six Homer Lee presses in operation the saving which would be effected would probably approximate 60 per cent. over the hand-presses, and 50 per cent. over the Milligan press.

In a letter addressed to you under date of May 2, 1882, by the Chief of the Bureau of Engraving and Printing, and published in Executive Document 199, first session, Forty-seventh Congress, House of Representatives (see copy in File No. 25) he states that, "as near as can be calculated, the saving effected in that time (January 30, 1878, to March 31, 1882) by the use of such steam-presses (Milligan pattern) is \$45,598.72, exclusive of cost of construction, alterations, and repairs to presses."

The saving effected by the six Milligan presses on impressions (see File No. 197) produced by them from April 1, 1882, to March 31, 1883, is shown in the following table :

Description of work.	No. of im- pressions.	Cost on Milligan press.		Cost if work had been done on hand- presses.		Saving.
		Per 1,000.	Total.	Per 1,000.	Total.	
2-ounce tobacco stamps	2,235,937	\$7.99	\$17,865.14	\$12.92	\$28,888.31	\$11,023.17
4-ounce tobacco stamps	2,134,362	8.71	18,590.29	17.90	38,205.08	1,614.79
50-cigar stamps	444,877	8.20	3,647.99	12.36	5,498.68	1,850.69
Total saving						32,488.65

The saving effected by the Homer Lee press from September 1, 1881, to March 21, 1883, is shown in the following table:

Description of work.	No. of im- pressions.	Cost on Homer Lee press.		Cost if work had been done on hand- presses.		Saving.
		Per 1,000.	Total.	Per 1,000.	Total.	
50-cigar stamps	790,007	\$5.41	\$4,273.94	\$12.36	\$9,764.49	\$5,490.55
8-ounce tobacco stamps	318,800	5.40	1,721.52	10.44	3,328.27	1,606.75
N. B. notes, black backs	240,340	4.92	1,182.47	8.86	2,129.41	946.94
Total saving						8,044.24

The rates of cost per 1,000 impressions used for these two tables are given in and calculated from the statement furnished by the Chief of the Bureau of Engraving and Printing (see File No. 152, Exhibit A.) The saving shown in these tables, added to the saving as given by the Chief of the Bureau of Engraving, above quoted, makes the total saving by all of the steam-presses prior to April 1, 1883, \$86,131.61.

The following table is an exhibit of the work executed by the steam-presses now in operation in the Bureau of Engraving and Printing for a period of one month, giving the daily average capacity as shown by the records of the Bureau. (See File 165, Exhibit B:)

Description of work.	Milligan press.				Homer Lee press.			
	Month.	Impres- sions.	Days.	Average per day per press.	Month.	Impres- sions.	Days.	Average per day.
U. S. notes, ones, faces	Apr., 1882	14,362	15	958	.....	.....	.....	.....
U. S. notes, ones, backs	Nov., 1880	84,200	25	3,368	.....	.....	.....	.....
N. B. notes, backs	May, 1879	44,900	20	2,245	Apr., 1882	87,890	25	3,515
50-cigar stamps	June, 1882	40,836	21	1,945	Oct., 1881	89,500	25	3,580
2-ounce tobacco stamps	Feb., 1882	78,400	23 $\frac{1}{2}$	3,372	.....	.....	.....	.....
4-ounce tobacco stamps	June, 1882	55,066	24	2,294	.....	.....	.....	.....
8-ounce tobacco stamps .....	.....	.....	.....	.....	Jan., 1882	107,700	25	4,308

The figures contained in the foregoing tables under this head show the relative economy of executing impressions on the several presses. The saving effected by the steam-power presses over the hand-presses arises in part from the larger number of impressions produced per day, by reason of which the cost of labor is reduced; and, in part, from a greater economy in the use of ink and other material. The Milligan press accomplishes a material saving in all of these particulars over the hand-presses. Its peculiar design, however, renders it liable to great expense for repairs, which very greatly affects the cost of producing impressions. The Homer Lee press, in its design, seems to secure great durability and thus to materially reduce the cost for repairs. Its average production per day is in excess of that of the Milligan press, as shown by the figures furnished; and its appliances are such as to secure perhaps the greatest possible economy in the use of power, ink, and other materials. In all of these particulars it has the advantage over the Milligan press; and therefore the saving effected by it is so much greater.

The Chief of the Bureau of Engraving and Printing, in compliance with a request from the committee, furnished a statement (see File No. 156) of the cost of producing impressions by the relief process on the presses now in the Bureau for printing by this process. This statement shows the average cost of producing such parts of the Government securities as have hitherto been printed by this method to be \$1.67 per 1,000 impressions. The parts of securities printed by this process can not be regarded as representing an average security, and the cost of producing 1,000 impressions of a whole security would be larger than the cost given for the parts of securities. No securities of any class have been printed by the Bureau of Engraving and Printing entirely by this process, and the preponderance of the testimony (see Files Nos. 42, 160, 168, 181, and 191) taken by the committee leads to the conviction that securities so printed could more readily be counterfeited than those printed by the process of plate printing. For these reasons the committee does not feel justified in recommending the further extension of relief-printing to Government securities.

(5) *Construction, durability, repairs, discontinuance, and use of presses.*—In a letter addressed to you, under date of July 12, 1882, by the Chief of the Bureau of Engraving and Printing, and printed in Ex. Doc. 224, first session, Forty-seventh Congress, House of Representatives (see copy in File No. 25) he states that the cost of constructing the five presses of the Milligan pattern owned by the Government and now in operation in the Bureau of Engraving and Printing, was as follows:

Construction	\$6,066.05
Drawings	359.69
Patterns	527.38
	6,953.12

And that the alterations made upon them cost \$569.82. The cost of the right of construction was for the five presses \$2,500.

From these figures it appears that the average cost of each of the five presses, including cost of right of construction, drawings, patterns, and alterations, was \$2,004.59; and the average cost of construction alone (labor and materials) was \$1,213.21 per press. This last amount is exclusive of the expense for overhauling or alterations which the presses subsequently received.

From the statement furnished to the committee by the Chief of the Bureau of Engraving and Printing (see File No. 152, Exhibit A) it appears that the cost of repairs on these five presses and the press owned by the patentee and in operation in the Bureau from December 15, 1880, to June 30, 1882, amounted to \$1,655.65, which makes an average for each press of \$183.96 per year.

From the same statement it appears that the repairs on the Homer Lee press in operation in the Bureau, from August 10, 1881, to June 30, 1882, amounted to \$72.22. The patentee of the press voluntarily reported an expenditure of \$11.71 in addition to this amount. These two items added together would indicate the average annual repairs as amounting to \$92.95. This sum is regarded as a high estimate of the cost of repairs for this press.

From the best information which the committee has obtained it is believed that the cost of a hand-press of the pattern now in use in the Bureau of Engraving and Printing is about \$150, including register attachment; and that the average cost of repairs on such a press would probably not exceed \$15 per year.

The following quotations are taken from the report (see File No. 83) made to the committee by Messrs. Herschel Main and B. C. Bryan, the naval engineers:

"As to the question of relative durability, a careful inspection of the details of the running parts of the two presses convince us that in this respect the Lee press is much the superior.

* * * * *

"As the result of our inspection as to the relative wear and tear of the working parts, we are of the opinion that the annual cost of repairs for a Milligan press will average at least double that for a Lee press, supposing the material and workmanship equal in the first place. We are also of opinion that the durability (or natural life-time) of the Lee press, working equally, will greatly exceed that of the Milligan, lasting probably three or four times as long.

"In regard to the question of first cost of the presses, as to which the committee desired us to give an independent estimate, we have consulted with Master-Machinist George Wilson, of the Washington navy-yard, and have agreed upon the following figures, viz:

"For cost of manufacture of a single Lee press, probably not less than \$5,000. Supposing the patterns provided, and with machinery especially adapted for the work, they might be made at a cost of from \$2,500 to \$3,000 apiece. For the Milligan press, given the same conditions, we are of opinion they might be manufactured at the rate of from \$600 to \$700 apiece.

"The above figures for durability and first cost must, of course, be regarded as only approximate. It is difficult, even for one engaged in the manufacture of similar machinery, to form beforehand an accurate estimate of the cost of a particular machine, and without a longer experience of the actual cost of repairing and keeping in order our estimate of durability as given above can not be considered as perfectly exact."

The committee does not have before it any evidence as to the cost of the Homer Lee press. The patentee has placed an estimate at from \$2,500 to \$3,000, with which the engineers agree, for a number of presses.

As shown above, the average cost of the original construction of each of the five Milligan presses was \$1,213.21. The patentee of the press has placed an estimate at \$750.

The committee concurs with the engineers as to the relative durability of the two presses and the cost for repairs; but it is apparent from the experience of the Bureau of Engraving and Printing in the construction of the five Milligan presses that the cost is above the estimate of the engineers.

The Milligan press has demonstrated in its work in the Bureau that it can print certain securities with an acceptable degree of excellence; and since the construction of the five Government presses of this pattern the hand presses have been practically discontinued in favor of this press for the printing of 2 and 4 ounce tobacco stamps. The press has executed the impressions done by it at a considerable saving over the hand-presses, as shown in the foregoing parts of this report. The committee must, therefore, conclude in favor of the adaptability of this press for certain classes of securities.

It is shown, however, by the facts hereinbefore presented, that the Homer Lee press now in operation in the Bureau has done the same classes of securities, and in two instances the same securities, as the Milligan press with equal or greater acceptability and at much less cost.

The committee regards it for the interest of the Government, as well as private individuals, to have its work done at as low a cost as possible consistent with its proper execution. With this view the committee is of opinion that it is for the interest of the Government to use the press which will do the work satisfactorily and accomplish the greatest saving. A calculation, based on the issues for the past year, has been made of the number of impressions annually required of the securities for the printing of which the steam-presses are adapted. A list of these securities and the number of impressions required per year, with the percentage for spoilage added, may be shown as follows:

Internal-revenue beer stamps	2,895,000
Internal-revenue strip-tobacco stamps	6,450,000
Internal-revenue snuff stamps	155,000
Internal-revenue cigar stamps	5,140,000
Internal-revenue cigarette stamps	485,000
U. S. notes, backs	5,419,000
N. B. notes, black backs	2,138,000
Checks and drafts	367,000
 Total	 23,049,000

In the preparation of this list those denominations of the several securities have been excluded of which such a limited number of impressions is required to be printed from month to month as would necessitate frequent changes of plates and thus not allow the printing of them by the steam-presses with economy.

The five presses of the Milligan pattern constructed and owned by the Government, and one press owned by the patentee and in operation in the Bureau, have the capacity, when working full time, of producing about 5,160,000 impressions per year. This would leave about 17,889,000 impressions which in the judgment of the committee could be satisfactorily executed by the Homer Lee press, and at less cost to the Government than by any other press which has come under consideration of the committee.

In all such cases as the present there is presented for decision the question of discarding what is called the "plant" on hand, and purchasing new machines. The question is to be generally solved by a calculation of the relative economy of continuing the use of the plant and of purchasing and using the more economical machines. The committee has made allowance for the continuance of the six presses of the Milligan pattern, but does not think it for the interest of the Government to extend the use of presses of this pattern.

The capacity of the Homer Lee press, when working full time, as shown in its experience in the Bureau of Engraving and Printing, is about 1,200,000 impressions per year. With this capacity fifteen presses of this pattern would be required to print the 17,889,000 impressions of the securities above mentioned. The committee, however, for reasons given under the next head, do not think it for the interest of the public service to use at once more than six Homer Lee presses of the pattern of that now in operation in the Bureau.

(4) *Other recommendations.*—The committee would recommend an inquiry as to what progress has been made in recent years in improving hand-presses for plate-printing, with a view of discovering and adopting, if it shall be found wise to do so, any presses which may enable the printing of securities by hand-presses more economically than by the presses now in use in the Bureau of Engraving and Printing. Though nothing was formally brought to the attention of the committee upon this subject, it is believed that there are improved hand-presses, the adoption of which in lieu of some or all of the hand-presses now in use would prove economical for the printing of what are classed as securities requiring the highest excellence in printing.

THE NEW HOMER LEE PRESS.

In compliance with your instructions, under date of January 19, 1883, the committee extended its investigation to a new press of the Homer Lee pattern, which was

placed in position in this city by the patentee for the purpose of the test. The press was found to be entirely new, and the parts had not yet been worn so as to secure a regular and even movement, and only a small number of tissues had been printed preparatory to the test.

The committee endeavored to afford every facility within its power to the patentee of the press, so as to secure the most satisfactory results possible in a limited test.

The first test was the printing of 1,000 impressions of 50-cigar stamps and 500 impressions of five-dollar national-bank note black-backs. After these impressions were printed, under the supervision of the committee, they were submitted to five experts chosen by the committee; and the result of the examination and classification as to the quality of the printing is shown in the following table:

Description of work.	Total.	Good.	Passable.	Rejected.	Average rejection.
					Per cent.
50-cigar stamps	1,000	212	712	76	7.6
N. B. notes, five-dollar, black-backs	500	54	233	213	42.6

These impressions were printed from the plates after they had been adjusted to the press, but without being hardened. A further test of the press was had by printing a short day's work from the plate for 50-cigar stamps, after it had been hardened as in the regular course of the preparation of plates for printing securities.

The result of the examination of these impressions by the same experts is shown in the following table:

Description of work.	Total.	Good.	Passable.	Rejected.	Average rejection.
					Per cent.
50-cigar stamps	6,488	988	4,961	531	8.31

Although every facility in the power of the committee was afforded to the press to secure the most satisfactory test, it should not be overlooked that the tissues and impressions printed, preparatory to and during the test, were the first trial of the press. The result of the printing of national-bank note black backs was not satisfactory. So many favorable conditions, however, are necessary for the proper printing of impressions of securities that the failure of a test can not certainly be referred to a particular cause. The work of the press leads the committee to the conclusion that it can print with an acceptable degree of excellence internal-revenue strip stamps for tobacco, snuff, and cigars; and it is believed that experience with the press in a thorough trial, would prove that impressions of this class of securities can be produced satisfactorily with but little, if any, greater average spoilage than upon the steam-presses now in operation in the Bureau. It is further believed that by experience, which would discover the requirements of the press—particularly as to the condition of the paper for proper working—the press could be developed to print other classes of the securities embraced within second and third grade work as classified by the committee.

Even should the spoilage in regular work by this press amount to 10 per cent. (which is not thought probable) there would yet be a large saving by the use of the press over any other press to which the attention of the committee has been called.

The principal difference between the Homer Lee press now in operation in the Bureau of Engraving and Printing and the new press is in the motion of the presses, the attachment of the plate, and the capacity for producing impressions. The press now in operation works one plate, prints in its regular work ten impressions per minute, has a reciprocating motion, and the plate is attached to a flat block which is laid on the bed of the press (see file No. 158, part 3). The new press also works one plate, and, when running at regular working speed, produces twenty impressions per minute, has a continuous circular motion, and the plate is enyed and attached to a drum or cylinder.

The naval engineers, at the request of the committee, made an examination of the new press and reported (see file No. 174) that the cost of construction, durability, and amount of steam-power required are in favor of the new press as compared with the "Homer Lee press" now in operation in the Bureau.

The conclusion of the committee as to this press is that one of this pattern can be used immediately, in connection with six of the pattern of the one now in operation

in the Bureau, and that, as experience with the press shall warrant, others may be used sufficient to print the full number of impressions, for the printing of which the Homer Lee press has hereinbefore been declared adapted.

The new press has some appliances which may be regarded as improvements upon similar parts of the press now in use in the Bureau; and in the construction of any presses like that in use, which may be purchased, it is believed that these improvements can be added without additional cost.

The remarks made under the first head above, in relation to the condition of the plates for the "Homer Lee press," now in operation in the Bureau of Engraving and Printing, are equally applicable to this press. During the progress of the tests upon the press, members of the committee had the opportunity of learning the degree of perfection which could be attained in the preparation of a plate to meet the requirements of the press for a smooth, even surface, free from depressions and highly burnished. After the plates were transferred in the usual manner they were cleaned, curved, and adjusted to the cylinder, and then "tapped up" and burnished. The plate for printing the first test on 50-cigar stamps was thus treated, and preparatory to the second test, it was straightened, re-entered, cleaned, again curved, and adjusted to the cylinder, "tapped up," burnished, and then hardened, and the test impressions printed. There was not the least perceptible injury done to the plate during this process.

These experiments proved the practicability of putting plates in the order required for successful printing by the press.

CONCLUSIONS.

The conclusions to which the committee has come, upon consideration of the facts hereinbefore presented, may be briefly recapitulated as follows:

(1) That the excellence of the impressions produced by the Homer Lee press reaches such a standard as to justify the use of this press for printing most, if not all, of the classes and denominations of internal-revenue stamps, all checks and drafts, the backs of United States notes, and the black-backs and tints of national-bank notes; with the qualification that it may not be economical to print all denominations of these securities for the reason that such a limited number of impressions of some denominations is required at one time, and there would not be a saving because of time lost in making frequent changes of plates.

(2) That the steam-power presses can execute the securities for which they are adapted at less expense than the hand-presses, and that the Homer Lee press can execute the same work at less expense than the Milligan press.

(3) That it is for the interest of the Government to discontinue the use of the hand-presses for printing those securities which it has been found can be printed with greater economy by the steam-power presses, and to use such a number of Homer Lee presses as will accomplish the printing of the securities for which it is adapted.

The committee expresses its thanks to the officers and employés of the Bureau of Engraving and Printing for the assistance rendered by them during the progress of the inquiry of the committee; also to Passed Assistant Engineer Herschel Main, and Assistant Engineer B. C. Bryan, of the U. S. Navy, for their professional assistance, and to Mr. J. W. Osborne, expert in photolithography, who kindly came before the committee and gave valuable information upon the subject of printing securities by the different processes.

Accompanying this report you will please find the journal containing the proceedings of the committee and the files of papers pertaining to this investigation.

Very respectfully,

FRANK L. FREEMAN,
THEODORE L. DE LAND,
H. M. EWING,
J. H. LICHLITER,
W. W. ELDRIDGE,
Committee.

Hon. CHARLES J. FOLGER,
Secretary of the Treasury.

[Indorsement.]

TREASURY DEPARTMENT, May 24, 1884.

The report of the majority of the committee is approved, and a letter to the Chief of the Bureau of Engraving and Printing will be prepared directing that the necessary steps be at once taken to acquire the Lee press now in the Bureau, as well as three presses of the cylindrical pattern recommended by the committee. Other presses to be acquired as the needs of the Department shall direct.

CHAS. J. FOLGER,
Secretary.

G.—DISSENTING REPORT CONCERNING LEE PRESS.

TREASURY DEPARTMENT, April 30, 1883.

SIR: We, the members of this committee appointed from the Bureau of Engraving and Printing, W. H. Earle and J. R. White, concur with the majority on all facts stated in the report and in all recommendations based on said facts, except as herein-after set forth. We non-concur with its findings relative to the Homer Lee press, by reason that we fail to recognize as a fact the statement that the character of printing executed by the Homer Lee press is of such a standard as to warrant its adoption by the Government for the printing of the securities embraced in grades 2 and 3, and disclaiming that such is the Bureau standard for such work. The fact that the Bureau has passed such work should be considered in connection with the fact that the press was being used experimentally and that the impressions produced thereon, when sufficiently perfect to be passable, had to be used, or that all of the work of the press be a loss. That the Homer Lee press may by development execute printing adapted to the lower grades of work required by the Government is possible; but such development contemplates large expense and patient indulgence. The press, therefore, should not be adopted by the Government until perfected by its owner; and if adopted, the number required be left with the Bureau.

Very respectfully,

WM. H. EARLE,
JOHN R. WHITE.

Hon. CHARLES J. FOLGER,
Secretary of the Treasury.

II.—PROTEST AGAINST FURTHER USE OF LEE PRESSES.

TREASURY DEPARTMENT,
Bureau of Engraving and Printing, April 16, 1884.

SIR: In view of the effort now being made to force upon this Bureau additional steam-presses of the Lee pattern, I have the honor to request that, before conceding to any demand upon you in this direction, you will consider the following points in addition to those recently presented, all of which is respectfully submitted as a protest against the further use of presses of this pattern on any of the issues of the Government:

Plate-printing is designed to produce an effect in appearance more obviously artistic than by any other process, rendering the product more difficult to imitate, and is, therefore, the best adapted for preparing securities. This effect contemplated in the printing exists in the engraved plate, and as the printing becomes more and more defective, so the protection against imitation is lessened, and as the protection is the desideratum to justify the expensive preparation of engraved plates for the securities of the Government, it should not be defeated by a quality of printing which is below the standard fixed by known, responsible, and disinterested experts.

In a division of this Bureau, known as the examining division, all the impressions printed on the plate presses are examined by trained and skilled examiners, who reject all that are below the established standard of quality of printing. This division is supervised by a competent superintendent, who is an expert examiner, assisted and advised daily, and as often each day as necessary, by the superintendent of printing, Mr. Morgan, who is also an expert of long standing, and an authority on the subject of plate-printing, considered equal to any in the country, and whose fairness of decision as to the standard of work to be issued has never, to my knowledge, been questioned. Besides these, there is in the division an officer—an expert also—called the final examiner, whose duty it is to review the rejected impressions daily and report to me in writing directly the apparent cause of spoilage. If the fault be found in the plate or the printing the remedy is promptly applied. With the organization of the division and methods of examining there has been no great difficulty in maintaining the standard of work, for if any impressions denote a defective plate, another plate is substituted; if they denote inferior printing, the attention of the printer is specially called to the fact, and in all cases the value of the excessive amount of spoiled sheets beyond a specific allowance is deducted from the printer's pay account, and the incident is made a matter of record against him which affects his standing in the Bureau to that extent that, in time of a reduction of the force, an accumulation of such charges on record would determine the question of his retention in the service. These facts are stated to inform you of the measures which are taken to maintain the established standard of plate-printing in the Bureau as essential for the protection of the securities printed in it, and I will say here that this protection must essentially add to the expense of

printing in rendering fully effective the plates already prepared by the expensive engraving process with the protective end in view.

So far what I have said refers to the work printed on the hand-presses in this Bureau. On these presses all the work necessary to produce an impression from the plate is done by hand; the plate is inked in, wiped off—that is, the surplus ink roughly wiped from the surface—polished, and pulled through the rollers of the press to make an impression by hand. To “polish” a plate is something upon which I would ask your thoughts to dwell a moment. To learn the trade of plate-printing under the rules of the Printers’ Trade Union and of this Bureau requires that the apprentice shall serve four years. Of this term it is required that the apprentice shall serve three years on the press; and in that time to become a competent printer it is necessary that he shall learn how to wipe and polish the plate and pull an impression, as well as to judge what constitutes a perfect or imperfect print when he sees it. This particular process consists in delicately touching with the palm of the hand, slightly powdered with whiting, the entire surface of the plate to remove from the unengraved parts all traces of ink after wiping, and to properly do this necessitates a variation in the touch of the hand in different directions and degrees of delicacy, in accordance with the positions and peculiarities of character of the engraving on the particular plate in hand. The sense of feeling in regulating the touch is here necessarily called into requisition, with the knowledge by experience as to what is requisite to get the effect in the impression, to reach or excel the standard. This polishing is, you must therefore know, the particular and vital part of the printing, and the printer who fails as a polisher does so because of his lack of artistic skill and judgment in accomplishing it.

As to the Lee steam-press, impressions can, perhaps, be printed cheaper on it than on the hand-presses (see Appendix A), but there its advantage ends—if considered in other respects it can be called “advantage”—for if cheapness alone be desirable, why stop at this press when still greater cheapness can be attained by other processes? The principle upon which the Lee press operates embraces the polishing process as an automatic movement, which has never, and, I believe, can never, be substituted for the hand movement, directed by the intelligence of the printer, to meet every variation and irregularity in any plate. That this substitution on the Lee press has never accomplished successful results is demonstrated by the fact that the quality of work done upon it in this Bureau has not reached a standard sufficiently high to be measured by that which governs all the other work: and, unfortunately, when in the first of its experimental trials here, the impressions printed by it were found so far below par in quality that a lower standard in the examining division had to be adopted for them, in order that the press’s experimental use might be continued without almost total loss of the work, the value of which would be chargeable to it.

The adoption of the lower standard is due to my predecessor, and I have refrained from raising it to that of the other work while the original direction of the Secretary of the Treasury is in force continuing the experimental use of the press. It is clear, however, that this discrimination in favor of the passage of the Lee work on its low standard has always tended to the embarrassment of the employés of the examining division and to the officers of the Bureau generally, it seeming to them to be a violation of their conscientiousness in their preferment for that work, and I do not see a way clear to relieving the Bureau from this difficulty without your aid and direction. I am satisfied that the prohibition of the further use of the Lee press, or the raising of the standard of the work which shall be passed from it to that of the regular standard of printing in the Bureau, which would be practically the same thing, would be fraught with loss to Mr. Lee, who seems to have no other foothold than this Bureau for the introduction of his press for use, as I am advised that none of the bank-note companies in this country, except, perhaps, Mr. Lee’s own company, will use it, although such companies are engaged principally in commercial work that does not generally require so high a standard of printing as is necessary for securities almost exclusively. But if the Lee press, now being experimented with, and which, according to the unanimous judgment of the experts here, is a failure in this Bureau, must be continued in it, I submit that the evil be permitted to rest with it, and I earnestly protest against an increase of it by the introduction of any additional presses of the kind.

I have made no specific allusion to the Milligan steam-press, for the reason that its polishing process, the only process except, perhaps, the rough wiping which is essential to perfect printing, is done by hand, and, if necessary, the rough wiping on this press may be done by hand also. Its principle is to apply machinery as a substitute for hand labor wherever the latter is simply manual, and not necessarily guided by intelligence, and is therefore adapted for printing any kind of work, limited only to classes which require long runs, and this restriction does not affect the quality of the work, but simply raises the cost of it nearer to that of all hand work. The Milligan press is, therefore, a hand-printing press so far as the application of intelligence in the polishing process is concerned, and its condition of work and the standard for the passage of it in its examination are the same as for the hand-presses.

Relative to the report lately made to you by the committee charged with the consideration of the relative merits of those presses, I beg to remark that the members of the majority of the committee were gentlemen unfamiliar with plate-printing and engraved work, the only knowledge they possessed of this work being that obtained in the investigation now under consideration, which certainly could not have made them equal in judgment to the members of the minority who have had life-long experience and are thorough, practical men.

I am led to believe from the reading of the report, and from Mr. DeLand's remarks at our interview, that Mr. Lee had complained to the committee, as well as to others, that every one connected with the Bureau had conspired against him to oppose all efforts to introduce his press in the Bureau. Why Mr. Lee should thus complain is singular. I know of my own knowledge, while acting as purchasing clerk for this Bureau, having full opportunity to observe, that Mr. Lee was afforded every facility in connection with operating his press in the Bureau that he asked and was in the power of the Bureau to afford. There was no opposition to granting any proper request for anything needful to giving his press a full and fair test. And since my assuming charge of the Bureau the same line of policy with reference to Mr. Lee's press has been fully carried out. So far as the officers of the Bureau were concerned, they not only were not adverse to Mr. Lee's press and its being placed experimentally in the Bureau, but each and all of them in their official capacity have always willingly and readily complied with every requisition from Mr. Lee or his superintendent, and all facilities were freely afforded him. It would appear that by these complaints Mr. Lee obtained what he desired—the sympathy of the committee—and won them to a more favorable opinion of his press than the facts warranted.

The committee had adopted and successfully executed an elaborate and thorough test of the work produced upon the three classes of presses, that is, the hand-roller, the Milligan, and the Lee press. There is no question but that the test was a proper one. It was substantially the test that had been applied to the work produced on the Milligan press before any of them were purchased, except that it was more elaborate in its detail. There is no question but that it was a fair test, and one well adapted for the end for which it was designed. It was exactly the same as to all the presses, there being no way in which the experts could distinguish the work executed upon any particular press, except by its inherent qualities. It was complete as to experts, comprising as it did representatives of the different processes of plate-printing and engraving and examiners of printed work, these experts being selected by the different interests before the committee. It was complete as to the work involved in the test, as to the number of denominations, and the quantity of sheets examined. It was complete as to the precautions to prevent a knowledge on the part of the experts as to what press the impressions were printed upon, so that they might not be influenced by any personal preference, prejudice, or interest. The result of this test, which the committee itself had formulated after mature consideration, was a decision that the work of the Lee press was not up to a proper standard by an overwhelming rejection of the impressions printed on that press, although the reports of this office show that to get 1,876 impressions required for the test from the Lee press, the enormous number of 23,569 impressions were actually printed, 21,693 being on manila tissues wet down and prepared in the same manner for printing as the regular paper (see Appendix B).

Here the committee's work ended. They had obtained the judgment of the experts selected by themselves in the manner prescribed by themselves. This was all that was sought by the Chief of the Bureau when he suggested the appointment of a committee. All he desired was a decision by such persons and in such manner as would remove all idea that the press was rejected on other grounds than those of public interests. What necessity was there for a further test? None whatever. But the committee for some reason were unsatisfied with the test, and proceeded to make additional or supplemental tests. In the first of these Mr. Lee was granted facilities not extended to the other presses, and even then the result was not satisfactory, as in one denomination nearly all the work printed on the press was rejected. The next test was made with a few sheets of a couple of denominations selected from the work that had passed, or was in a condition to pass, from the Bureau for use. The impressions were submitted to five ladies employed in the Bureau as examiners of printed work, and the result of this superficial examination is the basis upon which the majority of the committee made their recommendation that the Government shall purchase a number of these Lee presses.

To adopt this press would, undoubtedly, lower the standard of the work of this Bureau. It has been my effort since I have been Chief of the Bureau to keep the work up to a proper standard by holding the printers to a strict responsibility for their work, and by keeping the plates in a thorough condition. I have several times been on the point of ordering the stoppage of the Lee press because of the unsatisfactory work produced thereon, but have refrained from doing so solely because I did not care to have Mr. Lee claim that it was done to his prejudice. If this press were

adopted permanently in the work of the Bureau, it would be all but impossible to keep the plate-printers up to a high standard of work, for the reason that they are aware of the quality of work produced upon the Lee press, and would claim that inferior work executed by them was fully up to that standard. This will be fully appreciated when it is understood that the work of the Lee press is executed by one of the inferior processes known to plate-printers as "wet-rag printing." This process was used in printing music, labels, and other inferior work where cheapness was the chief end sought. If the Bureau were to permit the plate-printers on hand-presses to use the "wet-rag method," the printing could be very much more cheaply executed, but it would be decidedly inferior in quality, and would present the characteristics of the Lee press-work. In the Bureau, since its organization, quality has been the first end sought, and cheapness has been subordinate thereto. In my judgment this should be the policy of the Government in the future.

If these presses were adopted there would be one very serious embarrassment in determining where to place them in the Bureau building. The room in which the Lee press is now located is hardly large enough for the one press, and there is no other room on the ground floor which could be used for this purpose. It might be thought that, as the adoption of these presses would have a tendency to decrease the number of hand-presses required, the space made vacant by the removal of the hand-presses could be utilized for the Lee presses. It would not be safe to put the Lee presses on the top floor, inasmuch as the jar caused by their operation would seriously injure the building and interfere with the hand-presses. The Milligan presses have, for this reason, been kept in a very small room on the basement floor. This room is conceded to be entirely inadequate for the number of people and presses in it, but it is the best that the Bureau has been able to assign to them.

In conclusion, I beg to say that if additional Lee presses were placed in this Bureau their operation would have to be restricted to the printing of the most inferior classes of work, and I should feel conscientiously impelled not to employ them on any classes, except in emergencies where lack of other facilities would make it actually necessary to use them at the sacrifice of the quality of the work, and I earnestly beg that, before any sanction for their further use be given even the question of relative economy of production by this press and the others be considered by practical persons, who shall be free from selection by, or influence of, the owners of this press, and then only after the standard of the quality of the printing has been raised by your direction to that which now governs the work printed on the hand-polishing presses.

Very respectfully,

T. N. BURRILL,
Chief of Bureau.

Hon. CHAS. J. FOLGER,
Secretary of the Treasury.

[Appendix A.]

MILLIGAN PRESSES.

Class of work.	Impressions.			Cost.	
	Perfect.	Imperfect.	Total.	Total.	Per 1,000 sheets.
U. S. note backs.....	1,461,025	11,780	1,472,805	\$7,631.73	\$5.24
N. C. backs.....	253,099	11,475	264,574	2,087.22	7.88
50-cigar stamps.....	66,635	5,676	72,311	698.73	9.66
2-ounce tobacco, 40 subs.....	63,723	424	64,147	462.39	7.25

LEE PRESS.

Class of work.	Impressions.			Cost.	
	Perfect.	Imperfect.	Total.	Total.	Per 1,000 sheets.
U. S. note backs.....	13,343	2,150	15,493	\$184.87	\$11.93
N. C. backs.....	234,930	5,410	240,340	1,181.58	4.91
50-cigar stamps.....	319,650	13,378	333,008	1,832.79	5.50
2-ounce tobacco, 40 subs.....	44,430	1,013	45,443	344.78	7.89

HAND-PRESSES.

Class of work.	Cost per 1,000 sheets.
U. S. note backs.....	\$7.69
N. C. backs.....	8.86
50-cigar stamps.....	12.36
2-ounce tobacco, 40 subs.	12.92

The above shows the comparative cost of doing work on the Milligan and Lee presses, and comprises all classes that both presses have been engaged upon.

On the first three items the comparative cost shown is the same as that stated to the committee, but the last (2-ounce tobacco) is work that has since been taken upon the Lee press.

Reliance can not be fully placed on this comparison, for the reason that there are elements entering into it with respect to the printing of each class on either press that prevent an accurate determination of what would be the cost under similar conditions as to both presses.

Item 1 (U. S. notes).—Cost of work on Lee press \$11.93 per 1,000 sheets; on Milligan presses \$5.24 per 1,000 sheets. Unfavorable to Lee press, for the reason that a small number was printed on it.

Item 2 (N. C. note backs).—Cost of work on Milligan presses \$7.88 per 1,000 sheets; on Lee press \$4.91 per 1,000 sheets. Unfavorable to Milligan presses, because they were required to use inferior and previously rejected paper.

Item 3 (50-cigar stamps).—Cost of work on Milligan presses \$9.66 per 1,000 sheets; on Lee press \$5.50 per 1,000 sheets. Unfavorable to Milligan presses, because they were originally started on this work, and there was much delay before they could be adjusted at the start.

Item 4 (2-ounce tobacco).—Being printed on both Lee and Milligan presses since March 17 last, in that term the relative cost of work has been, on the Milligan presses \$7.25 per 1,000 sheets; and on the Lee press \$7.87 per 1,000 sheets, including repairs to presses. This appears unfavorable to the Lee press, for the reason that the Milligan press had previously run on this work, although it would show more unfavorably to the Lee press—that is, the cost on Milligan press (\$6.02) and on Lee press (\$7.58 per 1,000)—had no repairs been charged to either press, the Milligan press having undergone considerable repairs just at this time.

[Appendix B.]

Test impressions printed on the Lee steam-press in July and August, 1882, under the supervision of the committee.

Date.	Impressions submitted.	Class of work.	Waste impressions printed.
1882.			
July 25	100	N. C. brown backs.....	1,543
26	149	U. S. backs.....	1,890
27	51	..... do	687
27	10	N. C. black backs	704
28	90	..... do	618
28	(2-sub.) 100	..... do	151
29	48	Pension checks.....	339
31	48	½-pound tobacco.....	580
31	48	100-cigars	343
Aug. 1	48	50-cigars	365
2	48	Match stamps.....	543
2	2	Registered bond backs.....	561
3	46	..... do	765
4	48	8-ounce tobacco	1,625
5	2	½-barrel beer.....	1,404
5	46	..... do	702
7	48	20 cigarettes.....	266
8	48	Registered bond tints.....	660
9	104	N. C. black backs	1,595
10	96	..... do	260
11	100	U. S. note faces.....	517
11	100	N. C. faces.....	269
11	48	Registered bond faces.....	97
12	100	U. S. note faces.....	1,144
12	(2 sub.) 67	N. C. faces.....	207
14	(2 sub.) 39	..... do	420
14	100	..... do	435
15	(2 sub.) 8	Black backs.....	1,457
16	92	..... do	572
17	48	½ barrel beer	974

I.—LETTER OF E. O. GRAVES, CHIEF OF BUREAU, RECOMMENDING PURCHASE OF SIX MILLIGAN PRESSES.

TREASURY DEPARTMENT,
Bureau of Engraving and Printing, December 17, 1885.

SIR: I had the honor to receive, by reference from you under date of May 29, 1885, for an expression of my opinion thereon, a communication from William J. Gibson, of New York City, representing the estate of the late James Milligan, urging the introduction into this Bureau of more of the Milligan steam-power plate-printing presses. A report on the matter has been deferred until full consideration could be given by me to the whole question of the use of steam plate-printing in the production of the securities of the Government.

There are now in constant use in this Bureau, in the printing of revenue stamps, seven steam plate-printing presses, six of which are of the Milligan pattern, and the other of the Homer Lee pattern. In the Lee press the entire work of plate-printing is done mechanically, while in the Milligan press the final polishing of the steel plate is done by hand in the same manner as on the hand-presses. The Lee press has been commended by a committee appointed by the Secretary of the Treasury as preferable to the Milligan press for certain classes of printing, on the score of economy and on other grounds. The Secretary of the Treasury accepted the conclusions of the committee, and on May 26, 1884, authorized the acquisition by this Bureau of three additional Lee presses of an improved pattern; but, for some unexplained reason, the owners of the patent declined to furnish the presses. As the experience of this Bureau confirms the conclusion of the committee as to the superior efficiency and economy of the Lee press for the inferior grades of work, it was thought wise, before recommending the introduction of more presses of the Milligan pattern, to ascertain whether the declination of the Homer Lee Bank Note Company to permit the use of more of its presses was final. An effort was accordingly made to induce that company to reconsider its declination; but, after much delay, it informed me, on the 4th of November last, that it had decided not to renew negotiations with the Department for the use of its presses by the Bureau. It therefore appears that, if further steam plate-printing presses are to be introduced, resort must be had to the Milligan press. From a very full and careful consideration of the subject I have no hesitation in saying that it would be wise policy to acquire more presses of this pattern.

All of the internal-revenue stamps of the denominations of 2-ounce and 4-ounce tobacco required have, for some years past, been printed on the Milligan presses in a manner entirely satisfactory to the experts in printing and engraving of this Bureau, and to the officers of the Internal Revenue Bureau. Occasionally internal-revenue stamps of the denomination of 50-cigars, and backs of United States notes have also been printed on them in an equally satisfactory manner. It is believed that there is little, if any, difference in point of excellence between the work printed upon these presses and work of the same grade printed upon the hand-presses, while the cost of the printing is very much less. These six presses are now effecting an average saving to the Government of more than \$100 a day. At this rate the saving during a fiscal year, allowing 300 working days to the year, will be more than \$30,000, while the employes earn better wages than those who work on the hand-presses.

At least six additional Milligan presses can be used to advantage, there being a variety of work which can be printed on them at a saving proportionate to that above shown. The classes of work which can be thus satisfactorily printed are the backs of United States notes, 50 and 100 cigar stamps, and 1, 3, 8, and 16 ounce tobacco stamps. The saving in plate-printing alone on these classes of work would be 56 per cent. of the rates now paid for printing them on the hand-presses. The six presses would print all of the United States note backs required, if the production is kept up to the rate of 6,000,000 sheets a year, and all of the 8-ounce tobacco stamps. The annual saving upon these two classes of work would be \$25,500. If the production of United States notes be not maintained at 6,000,000 sheets a year, other work can be executed on the presses and the saving would be substantially the same, as the percentage of saving per thousand sheets is about the same on all classes of work which the press is capable of doing.

The Milligan estate offers to permit new presses to be built on the same terms as the five presses last built for the Bureau, a payment of \$500 for each press and a royalty of \$1 for each 1,000 impressions printed thereon. These terms are thought to be reasonable, and it is recommended that they be accepted, and that a contract in accordance therewith be entered into with the legal representatives of the Milligan estate. It is also recommended that, in order to secure thorough construction, the presses be built by experienced press-builders, and not by the mechanics of this Bureau as were the last five presses of this pattern. It is estimated that the cost of each press will not at the highest figure exceed \$1,000, so that the total cost will not be more than \$1,500 a press. The cost of the presses would therefore be made good to the Government by the saving effected in 106 working days. Their use would save

the services of 24 plate-printers and 18 printers' assistants. The amount saved would enable the Department (1) to put an additional plate printing, such as they formerly bore, on the faces of the legal-tender notes of the denomination of \$5 and upwards, or (2) to restore the second plate printing on the backs of the national-bank notes, or (3) to replace the surface-printed tints on the internal-revenue stamps with plate printing by Milligan presses. If none of these courses should be deemed wise, the saving would, of course, go to reduce the expenses of printing the public securities, and the estimates for 1887 should, in that event, be reduced accordingly.

I return herewith Mr. Gibson's letter of May 27, 1885, as well as that of October 19, 1885, also referred to me by the Department. I also inclose a copy of my letter of October 20, 1885, to the Homer Lee Bank Note Company relative to the renewal of negotiations for the use of its presses by the Government and a copy of its answer of November 4, declining to renew negotiations.

Very respectfully,

E. O. GRAVES,
Chief of Bureau.

Hon. DANIEL MANNING,
Secretary of the Treasury.

J.—LETTER OF O. E. GRAVES, CHIEF OF BUREAU, RECOMMENDING PURCHASE OF SIX ADDITIONAL MILLIGAN PRESSES.

TREASURY DEPARTMENT,
Bureau of Engraving and Printing, August 13, 1887.

SIR: I have the honor to submit, for the consideration of the Department, the question of the acquirement by this Bureau of additional Milligan steam plate printing presses with a view of printing thereon internal-revenue stamps of the class known as 50-cigar stamps. The presses of this pattern in use by this Bureau have heretofore been able to print satisfactorily only those classes of printing in which green ink is used. The very successful operation of the presses acquired by the Bureau last year in printing the backs of silver certificates and the saving resulting from their use, have led to the consideration of the question whether the revenue stamps printed in black might not also be printed on presses of the same pattern. As the 50-cigar stamp is printed in greater numbers than any other denomination, and as the character of the work is well adapted for steam printing, it was determined to test the press in the printing of these stamps. The owners of the patents were also naturally desirous of extending the operation of the presses, and, with this view, offered to build a press with special reference to this class of work, and to set it up in this Bureau at their own expense, giving the Government the privilege of purchasing it if it should prove satisfactory. This proposition was accepted, and the press has for some time been in operation in this Bureau.

The experiment has shown beyond question that the 50-cigar stamps can be printed on Milligan presses of this pattern in a satisfactory manner and with a great saving of expense. The estimated number of sheets of these stamps to be printed during the current fiscal year is 6,280,000; the cost of printing them on the hand-presses would be \$59,660; to print them on the Milligan presses would, it is estimated, cost \$29,516, a saving of \$30,000 per annum, or more than 50 per cent. Considered simply as a question of economy, therefore, the introduction of more of these presses is desirable. But there are additional reasons for their introduction at this time. The number of plate-printers employed is limited by law. The estimate for the number to be employed during the current fiscal year was made before the passage of the act granting fifteen days' leave of absence to the employés of this Bureau, and provision was made for only such a number of printers as would be required to produce the estimated quantity of work if working continuously with only such casual absences as have heretofore occurred. The granting of fifteen days' leave of absence therefore directly impaired the productive capacity of the printers in the proportion that the absences were thereby increased. It was hoped, when the provision was enacted, that the printers remaining on duty might by extra exertion be able to make up for the loss of production occasioned by the absentees, but, judging from the experience thus far during the fiscal year, it is doubtful whether this will be the case.

The delivery of notes and certificates to the Treasurer's Office is now 76,000 sheets, and the delivery of stamps to the Internal-Revenue Bureau 850,400 sheets below the estimated deliveries. Moreover, the Treasurer is desirous of increasing the production of notes and certificates beyond the estimated quantity, so as to accumulate a reserve of unissued notes sufficient to meet the demands for six months. The building up of such a reserve would give the notes an opportunity to season, and so add greatly to their durability, and would also enable the Treasurer to meet the increased demands

upon him for notes which occur at certain seasons of the year. While it is possible that, with the coming of cooler weather and the return to duty of those absent on leave, the Bureau might, before the end of the fiscal year, produce the full quantity of work on which the estimates were based, it would not be possible with its present facilities to do anything toward building up the reserve that the Treasurer desires.

In view of these considerations I recommend to the Department that authority be granted to procure six additional steam plate-printing presses of the Milligan pattern. I inclose herewith a copy of a letter dated June 15, 1887, from William J. Gibson, the attorney of the patentees and owners of the press, giving the Government the privilege of purchasing the press recently put in operation for \$1,250, and a royalty of \$500, and a further royalty for its continuous use of \$1 for each 1,000 impressions printed thereon, and also a copy of a letter from the same person, dated the 8th instant, offering to furnish five additional presses of the same size, strength, power, and capacity on the same terms. The proposed price is \$250 greater than that paid for the six presses purchased last year, but, in the opinion of the machinists of this Bureau, the superiority in construction of the press last introduced fully warrants the difference in price. The use of black ink requires a stronger construction of the press in many of its parts.

The attorney of the patentees states, in a letter dated the 11th instant, a copy of which I also inclose, that the price to be paid by them for the construction of the presses is \$1,450. The offer to furnish them to the Government for \$1,750, including the bonus or royalty, is equivalent to an abatement of \$200 in the royalty in each press. If the presses are purchased on these terms, and applied to the printing of 50-cigar stamps, their cost will be made good to the Government by the saving in the cost of printing in about six months.

The only consideration that weighs against the introduction of the presses is the possibility of the repeal of the tax on tobacco. In that event the presses would probably be of no further service to the Government. On this point I can only suggest that it would seem wise for the Department to deal with the state of things existing under the present laws, without reference to the possibilities of future legislation; that, even if a reduction should be made in the internal revenue, it is possible that the tobacco tax may be reduced instead of abolished, and that, if the abolition of the tax should be deferred for six months after the introduction of the presses, they would have paid for themselves in the meantime.

Very respectfully,

E. O. GRAVES,
Chief of Bureau.

Hon. C. S. FAIRCHILD,
Secretary of the Treasury.

K.—LETTER OF E. O. GRAVES, CHIEF OF BUREAU, RECOMMENDING RESTORATION OF TWO PLATE-PRINTINGS ON BACKS OF NATIONAL-BANK NOTES.

TREASURY DEPARTMENT,
Bureau of Engraving and Printing, January 11, 1888.

SIR: I duly received your letter of the 16th ultimo, requesting me to furnish you with the information which will enable you to lay before Congress an estimate of the cost of preparing new plates and currency of the series of 1882 for 796 national banks which are still entitled to receive notes of the series of 1875, and stating that to print a fresh supply of currency for them about 300,000 sheets of paper will be required; and also your letter of the 20th ultimo in which you state that you think it will be safe to make my estimate for 1,149 new plates for these banks, and that the estimate for the cost of these plates and 300,000 sheets of paper and the printing of the same will be in addition to the estimates for plates and printing submitted to Congress by me for the current needs of the next fiscal year.

In reply I beg to say that a careful calculation shows that the cost of preparing the additional number of face plates and of printing the additional number of sheets of national currency of the series of 1882 mentioned by you will be \$42,579.60, which should be distributed among the three appropriations for the support of this Bureau as follows:

Compensation of employees.....	\$26,329.10
Plate-printing.....	5,250.50
Materials and miscellaneous expenses.....	11,000.00

I beg to say, however, that if any steps are to be taken in the direction of making the notes of all the national banks uniform in design, the most desirable course, in my

opinion, will be to discard the brown backs of the series of 1882, and to replace them with backs of the design used on the series of 1875. The backs of the series of 1875 are printed in two colors, and consist of a green border of lathe-work and ornamental work, embracing denominational counters and the legend, and of an engraving of some appropriate subject from American history beautifully engraved and printed in black. The two colors afford a pleasing contrast, while the two printings and the quality of the work furnish excellent protection against counterfeiting.

In the backs of the series of 1882, the old borders have been retained, but the beautiful black vignettes have been dropped, and the space formerly occupied by them has been filled in with geometric lathe-work of a cheap and open design. This lathe-work affords little protection against counterfeiting, inasmuch as it is cut directly on the bed piece, so as to print the dark lines, while, in order to insure the best protection from this class of work, it should be reversed, so as to show the white lines. These backs are printed in brown ink, and over the lathe-work covering the center of the plate the charter number of the bank is printed in green ink from brass dies on an ordinary power-press. The combination of the two printings is ugly in the extreme. It does not furnish adequate security against counterfeiting, and it is greatly inferior to the backs of the series of 1875, which it replaced. I therefore earnestly urge that, if the necessary appropriation can be obtained, the two plate-printings of the old design be restored. If necessary, in order to distinguish the backs of the notes issued under this proposition from those of the series of 1875, the color of the border may be changed from green to some other appropriate color. To carry into effect this suggestion would require for the next fiscal year an appropriation of \$12,000 additional to that for which an estimate is submitted above, making a total appropriation of \$54,579.60, distributed under the following heads:

Compensation of employés	\$26,329.10
Plato-printing	14,650.50
Materials and miscellaneous expenses	13,600.00

The appropriation of this amount, in addition to that for which estimates have already been submitted to Congress, would not only provide for the additional plates and printing required to carry into effect your recommendation for doing away with the distinction between the notes of the series of 1875 and those of the series of 1882, but would enable the Bureau to place two printings upon the backs of all national bank-notes printed after the 1st of July next.

I suggest, also, that whether or not any other change be made in the printing of the backs of the national currency, the coats of arms of the several States and Territories be omitted and replaced with a design uniform for all notes of the same denomination, no matter where the bank by which they are to be issued may be situated. The retention of these coats of arms requires the preparation of separate back plates for each denomination or combination of denominations for each State and Territory in which there is a national bank, the keeping on hand of a stock of backs printed from each of these plates, and the keeping of the accounts necessary to show the state of these several stocks, without any compensating advantage to the banks or to the public.

Respectfully, yours,

E. O. GRAVES,
Chief of Bureau.

Hon. W. L. TRENHOLM,
Comptroller of the Currency.

L.—REPORT ON OPERATION OF STEAM-POWER PLATE-PRINTING PRESS.

TREASURY DEPARTMENT,
Bureau of Engraving and Printing, March 8, 1888.

SIR: I have the honor to return herewith the following resolution adopted by the House of Representatives February 21, 1888, and referred to me by the Department February 23 for report:

“Resolved, That the Secretary of the Treasury be, and he is hereby, directed to furnish for the information of the House of Representatives the number of steam-power presses used in plate-printing in the Bureau of Engraving and Printing, whether the same are owned by the Government; if not, from whom leased, the name and address of the owners, the amount of royalty paid, and time of payment, and the reason why the Government is not the owner of said presses, the average cost per diem when in operation, including wages to attendants.

"The number of hand-plate presses, the cost of each per diem when in operation, including the wages of attendants.

"The average percentage of work performed in this department by both steam and hand presses.

"The labor performed by one steam-press is equal to the labor of how many skilled hand-pressmen?

"Whether the work performed by steam-presses is equal in quality, finish, and workmanship to that performed by the hand-presses?"

The following answers to the several inquiries made in the resolution are respectfully submitted, the information as to the amount and cost of the printing executed being based on the record of the work done in January, 1888:

(1) Nineteen steam-power presses are used in plate-printing in this Bureau, 18 of which are of the Milligan pattern and 1 of the Lee pattern.

(2) The 18 Milligan presses are owned by the Government; the owner of the Lee press is Mr. Homer Lee, New York City.

(3) A royalty of \$1 for each 1,000 perfect sheets printed on the Milligan presses is paid to the owners of the patents of the press, and a like royalty for each 1,000 perfect sheets printed on the Lee press is paid to the owner of that press. The payments of royalty are made monthly. The owners of the patents of the Milligan press are the estate of the late James Milligan, the patentee (Mrs. Elizabeth R. Milligan, executrix, of Brooklyn, N. Y.), and Mr. Charles F. Steele, of Philadelphia. The amount of royalty paid for the use of presses of each class since their introduction into the Bureau is as follows:

Period.	On Milligan presses.	On Lee presses.
Fiscal year—		
1879.....	\$383.10	.....
1880.....	879.65	.....
1881.....	2,351.48	.....
1882.....	4,564.21	\$767.30
1883.....	5,439.89	664.22
1884.....	5,126.72	705.39
1885.....	4,693.27	925.70
1886.....	4,557.27	929.32
1887.....	7,153.92	928.87
July, 1887.....	956.48	83.10
August, 1887.....	979.38	84.53
September, 1887.....	1,051.52	93.36
October, 1887.....	1,150.04	96.10
November, 1887.....	1,210.67	84.72
December, 1887.....	1,206.61	81.82
January, 1888.....	1,428.11	88.71
February, 1888.....	1,428.20	90.30
	44,560.52	5,623.44

(4) The Government does not own the Lee press for the reason that the owner has failed to submit terms for its sale to the Government, but has allowed it to remain in the Bureau without compensation for its use other than the royalty above mentioned.

(5) The average cost of the steam-presses per diem when in operation, including the wages of attendants, is \$19.74 per press.

(6) There are in use 170 hand-presses, of which 154 are side presses and 16 "D" presses.

(7) The average cost of the hand-presses per diem when in operation, including the wages of attendants, is \$10.97 per press.

(8) The average percentage of the total plate-printing of the Bureau performed by steam-presses is 33.9; by hand-presses, 66.1.

(9) The labor performed by one steam-press is equal to the labor of 4½ hand-pressmen.

(10) During the last three years there have been printed on the Milligan presses the 2 and 4 ounce tobacco stamps, the backs of silver certificates of the denominations of \$1, \$2, \$5, and \$10, and the 50-cigar stamps. In the opinion of the experts of this Bureau the backs of the \$1, \$2, \$5, and \$10 silver certificates, and the 2 and 4 ounce tobacco stamps, are equal in quality, finish, and workmanship to the work of these classes performed by the hand-presses. The 50-cigar stamps compare favorably with a large part of the hand-work of the same class. At present only the 2 and 4 ounce tobacco stamps and the backs of the \$1 and \$2 silver certificates are being printed on these presses.

During the last year there have been printed on the Lee press only the 2 and 8 ounce tobacco stamps. The impressions printed on this press are considerably weaker in color than those printed on the hand-presses. In other respects they are equal in quality, finish, and workmanship to the work of the same classes performed by the hand-presses.

Respectfully, yours,

Hon. C. S. FAIRCHILD,
Secretary of the Treasury.

E. O. GRAVES,
Chief of Bureau

